CHAPTER 6 SPECIFICATIONS FOR MANUFACTURE OF SIGNS

CONTENTS

NOTE:

THE MENTION OF COMPANY AND/OR PRODUCT NAMES IN THIS MANUAL IS INTENDED SOLELY FOR GUIDANCE, AND IS NOT TO BE CONSTRUED AS MANDATORY, OR AN ENDORSEMENT IN ANY MANNER BY THE NATIONAL PARK SERVICE.

INDIVIDUAL CONTRACTING OFFICERS ARE RESPONSIBLE FOR INSURING THAT FEDERAL PROCUREMENT REGULATIONS ARE FOLLOWED FOR EACH INDIVIDUAL PROCUREMENT.

6-10 DESCRIPTION OF STANDARDS AND OPTIONS

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6-10 DESCRIPTION OF STANDARDS AND OPTIONS

6-11 EXPLANATION OF STANDARD BASIC SIGNS AND OPTIONS.

Basic sign compositions are described below to enable the sign manufacturer to develop unit prices for contract work.

6-11.10 TRAFFIC CONTROL SIGNS

6-11.11 Basic Sign

a. *Color:* As specified in MUTCD.
b. *Copy:* As specified in MUTCD.
c. *Size:* As specified in MUTCD and Standard Highway Signs Book unless otherwise specified.
d. *Substrate:* High density overlay (HDO) plywood.
e. *Reflectivity:* Reflective sheeting with silkscreen copy and border.
f. *Edges:* Painted dark brown.
g. *Sign Back:* Unpainted.
h. Transparent film on top edge of sign.

6-11.12 Options

a. *Substrate:* Aluminum, FRP panel (polyplate).
b. *Copy:* Die-cut alphabets, numerals, arrows, and symbols.
c. *Sign Back:* Painted brown.

6-11.20 GUIDE, INFORMATIONAL, AND ENTRANCE SIGNS (VEHICULAR SIGNS)

6-11.21 Basic Sign

a. *Color:* White legend and border on brown background.
b. *Copy:* NPS Modified Clarendon alphabet.
c. *Size:* As determined using NPS Modified Clarendon lettering and spacing, for the designated sign category.
d. *Substrate:* High density overlay (HDO) plywood.
e. *Reflectivity:* Reflective sheeting background with die-cut reflective legend and borders.
f. *Edges:* Painted dark brown.
g. *Sign Back:* Unpainted.
h. Transparent film on top edge of sign.

6-11.22 Options

a. Aluminum or FRP panel substrate.
b. Sign back painted dark brown.
c. Dimensional lumber with routed copy, painted or stained background and nonreflective painted copy (entrance sign only).
d. Routed HDO plywood, painted. Copy on one side only, unless otherwise specified (entrance sign only).
e. White legend and border on green background, standard highway alphabet as specified in MUTCD.
f. Any standard approved alphabet.

6-11.30 PEDESTRIAN DIRECTION SIGNS

6-11.31 Basic Design

a. *Color:* White legend and border on brown background.
b. *Copy:* NPS Modified Clarendon alphabet.
c. *Size:* As determined using NPS Modified Clarendon lettering and spacing, for the designated sign category.
d. *Substrate:* High-density overlay (HDO) plywood.
e. *Reflectivity:* Reflective sheeting background with die-cut or silkscreened reflective legend and borders.

f. *Edges:* Painted dark brown.
g. *Sign Back:* Unpainted.
h. Transparent film on top edge of sign.

6-11.32 Options

a. *Substrate:* Dimensional lumber, anodized aluminum, aluminum plate.
b. *Routed Copy:* NPS Modified Clarendon, Engineering Standard or an approved standard alphabet. (Painted, natural or burned finish).

6-11.40 NPS ARROWHEAD EMBLEMS

6-11.41 Basic Design

a. *Substrate:* Dimensional lumber.
b. *Copy/Art Work:* Routed letters and graphics, photographically reproduced from NPS drawing no. PG-1005-A.
c. *Size:* As determined by NPS Sign Manual.
d. *Painted Colors: matching Federal Standard 595a*

Background	Cocoa brown	#20233
Trees and buffalo outline	Dark blue/green	#34058
Mountain and lake	Cream	#23690
Lettering	White	#17875

6-11.42 Options

a. HDO plywood substrate with routed and painted copy and artwork.
b. High-density rigid polyurethane foam substrate with molded and painted copy and artwork.
c. Silkscreened decal on reflective or non-reflective sheeting.

6-20 REFLECTORIZED SIGNS

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6-20 REFLECTORIZED SIGNS

6-21 REFLECTORIZED SIGNS

6-21.10 DESCRIPTION. This specification applies to the furnishing of reflective signs constructed on plywood or aluminum substrate or plastic panels to the dimensions in these specifications and as ordered on the sign requisitions. Work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct; packaging for shipping; obtain carrier; and shipping the signs via Government Bill of Lading or Parcel Post.

6-22 MATERIALS

6-22.10 SUBSTRATE

6-22.11 Aluminum. The aluminum substrate shall be 6061-T6 and otherwise in conformance with ASTM STD B-209. The thickness shall be 0.080 inches for all signs.

6-22.12 Plywood. This shall be High Density Overlay (HDO), two sides, ¾ inch 7-ply, Douglas fir, exterior plywood, Product Standard PS 1-74, Group 1, with a B grade veneer on both faces. *Mill-oiled concrete form, plywood shall be prohibited.* Surfacing overlay material weight shall be high density 60-60, non-oiled, resin impregnated fiber permanently fused to the base panel under heat and pressure. Panel weight shall be approximately 2.2 pounds per square foot. Overlay color shall be black. Each panel shall be edge-branded HDO B-B G1 EXT PS 1-74. The Contractor shall supply the Contracting Officer (CO) with APA certification that the plywood meets all the above requirements.

6-22.20 REFLECTIVE MATERIALS

6-22.21 Reflective Background, Legend, Border and Symbols. Retroreflective materials shall comply with "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects", FP-85 and Federal Specification L-S-300C.

The Contractor shall furnish a certification that the materials comply with the requirements of FP-85 and L-S-300.

The Contractor shall indelibly mark each carton of retroreflective materials showing the date received. No more than 12 months shall have elapsed from the date of purchase from the manufacturer to the date of application on the substrate.

6-22.21a Retroreflective Sheeting - Type II. The materials as listed in these specifications shall comply with FP-85, Section 718 and L-S-300C as indicated below:

Colors shall be as specified in specifications for Standard Highway Sign Colors (FHWA, HTO-21).

6-22.21b Retroreflective Sheeting - Type III. The materials as listed in these specifications shall comply with FP-85, Section 718 and L-S-300C as shown below:

Colors shall be as specified in specifications for Standard Highway Sign Colors (FHWA, HTO-21).

6-22.21c Legend, Border, and Symbols. The materials as specified on the requisition shall comply with section 6-22.21.

Type L-1 - screen process, applied, or

Type L-3 - direct applied characters (depending on the type of sign ordered).

6-22.22 Top Edge Treatment Film. Film shall be 3" wide, clear and transparent with a sun-resistant pressure sensitive, non-yellowing adhesive, "Scotchcal"

transparent film #639 or CO-approved equivalent.

6-22.30 TREATMENT OF PLYWOOD SIGN EDGES

6-22.31 Wood Primer. The wood primer shall be as recommended by paint (enamel) manufacturer.

6-22.32 Enamel. Benjamin Moore PENTAFLEX enamel or CO-approved equivalent.

6-23 CONSTRUCTION

6-23.10 WORKMANSHIP. Construction shall be high quality with no visible defects in the finished product. Fabrication shall be in accordance with these specifications, drawings, and detailed diagrams.

6-23.20 WOODWORKING

6-23.21 Board Joining and Cleating. Signboard panels shall be fabricated without cleats or joints.

6-23.22 Machining. Drilling shall be done with high-speed drills. To avoid chipping of the back overlay, a solid backing block shall be used during drilling. High-speed saws shall be used. Saw cuts shall be clean and true. Power saws used for cutting shall have little or no set and have as much lead as possible. Panels shall be fed through saws slowly to avoid damage to the brittle overlay. Table saws shall be set so that the blade extends through the panel not less than ½ inch.

6-23.23 Dimension Tolerances. Dimensions for signboard panels shall be as shown on the detail drawings, with a tolerance of ± ¼ inch.

6-23.24 Edge Sanding and Finishing. All panel edges shall be sanded clean and free of splinters and burrs and shall be smooth to the touch.

6-23.25 Panel Surfaces. These shall be free of warp, checking, slits, open joints, loose knots, and any other defects which interrupt smooth continuity of the panel surface (edges included).

6-23.26 Plywood Storage and Handling. The Contractor shall store the plywood for signs in an enclosed and well-ventilated building. Stored plywood shall not be placed directly on dirt or concrete surfaces. Panels shall be stacked flat. Care shall be used in handling plywood to prevent damage to corners, edges, and faces.

6-23.30 PREPARING PLYWOOD PANELS FOR RETROREFLECTIVE SHEETING

6-23.31 Sanding and Cleaning. Sign face overlay surface of each sign panel shall be sanded with 50 to 60 grit sandpaper on an orbital sander.

Overlay surfaces shall be clean. Edges shall be sanded prior to priming and painting. All panel edges shall be sanded clean. Coregap holes on the edge shall be filled with Mameco International Vulcan 116 polyurethane sealant, Thiolkol Pecora Synthacalk GC-9 polysulfide sealant, or a CO-approved glazing compound to produce a flat, smooth surface.

6-23.32 Paint Room Facilities. Primer and enamel shall be applied and dried at an air temperature of not less than 65 °F in a well-ventilated, dust-free, enclosed paint room. The paint room shall be separated by full partitions from shop woodworking areas.

6-23.33 Priming and Enamel Application. Sign surfaces shall be clean and free of loose material prior to painting. The sign panel faces shall not be primed or painted. All sign panel edges shall be primed and enameled. One coat of the specified primer (Section 6-22.31) shall be applied to the panel edges prior to application of retroreflective sheeting. One coat of the enamel (Section 6-22.32) shall be applied after application of retroreflective sheeting. Cure time between enamel coats shall be as specified in writing by the manufacturer. Prime plus paint thickness shall provide a minimum of 2 mils ± ½ mil thickness of dry paint film.

6-23.34 Panel Face Cleaning. Successful adhesion of retroreflective sheeting is dependent upon a totally clean and well-scarified panel face to receive the adhesive. Before application of the sheeting, the face shall be free of all foreign matter such as paint or dust.

6-23.40 METALWORKING. The aluminum shall be free of burrs and pits on both sides, including edges and holes, and shall be made ready for application of the sheeting.

6-23.41 Surface Preparation. The aluminum shall be thoroughly cleaned and degreased with solvent and alkaline emulsion cleaner by immersion, spray, or vapor degreasing and dried prior to application of the sheeting coat. The aluminum shall be new and corrosion-free with holes drilled or punched, corners rounded to the radii shown in the drawings, and all edges smoothed prior to application of the sheeting.

6-23.50 RETROREFLECTIVE SHEETING

6-23.51 Colors. These colors shall be as prescribed in the MUTCD or attached requisitions.

6-23.52 Application Methods. The method of application of sheeting, letters, numerals, and symbols shall be precisely as prescribed in writing by the manufacturer of the sheeting. The applicator diaphragm shall have at least two pyrometers centrally attached. The applicator shall also have a cycle control unit approved by the sheeting manufacturer.

Temperature control calibration and accuracy monitoring of the approved cycle control unit shall be required each day that the heat and vacuum applicator is operated. "Teletemp Temperature Recorders" (temperature measuring devices) shall be used. Applicator operating temperature shall be calibrated with the specified temperature measuring device each day of operations, and:

1. Whenever different substrate materials are being used.
2. Whenever a diaphragm, light-bulb, cycle-control unit, or thermocouple is replaced.
3. Whenever different types or different colors of reflective sheeting are used.

The sheeting shall be precut to size or trimmed to the edges. The entire face of the panel shall be covered with one unspliced sheet.

Flexible sheeting shall be positioned to provide $\frac{1}{8}$ inch to $\frac{5}{32}$ inch overlap onto all panel edges after trimming. Use of two reflective faces (dual face) on one plywood panel is prohibited.

6-23.60 RETROREFLECTIVE LEGEND

6-23.61 Legend Type. The legend shall be applied by using die-cut, adhesive-backed letters, numerals, and symbols.

6-23.62 Use of Positionable Legend. If Class 1 adhesive-backed legend is used, characters shall be firmly squeegeed, after proper alignment, to ensure complete adhesion. No loose or curled edges and no bubbles or blisters will be permitted.

6-23.63 Legend Series. All regulatory, warning, construction, and maintenance signs shall conform to the MUTCD. All directional guide/informational signs shall use NPS Modified Clarendon letters and numerals unless otherwise specified.

6-23.64 Legend Spacing and Layout.

6-23.64a Spacing and Layout for Standard Traffic Signs. Spacing and Layout for all standard regulatory, warning, construction, and maintenance signs shall conform to the "Standard Highway Signs Book".

6-23.64b Spacing and Layout for Modified Clarendon Lettering. Spacing and Layout for all signs constructed for NPS Modified Clarendon alphabet shall conform with Chapter 5 of the NPS Sign Manual.

6-23.65 Tolerance for Horizontal Alignment. Letters, numerals, and symbols shall be horizontally aligned to a tolerance of ± 1/16 inch. Tests of each sign-board shall be as follows:

Place a metal straightedge along the bottom of a series of letters forming each line of the sign. In each line, letters shall not vary more than 1/16 inch from that line.

6-23.66 Tolerance for Vertical Alignment. Letters, numerals, and symbols shall be vertically aligned to a tolerance of ± 1/16 inch. The following tests shall be performed on each letter in each line:

Place a metal straightedge along the bottom of a series of letters forming each line of the sign. Place a square along the straightedge and test the trueness of vertical faces of individual letters. Letters shall be normal to the square within 1/16 inch.

6-23.70 NONREFLECTIVE LEGEND

6-23.71 Legend Series. All letters, numerals, and symbols shall be as prescribed in Section 6-23.64.

6-23.72 Tolerance for Horizontal Alignment. As described in Section 6-23.65.

6-23.73 Tolerance for Vertical Alignment. As described in Section 6-23.66.

6-23.74 Silkscreening. Letter styles shall conform to specifications for die-cut legend in Section 6-23.64.

Screen processing, when used, shall be of careful workmanship with neat, clean lines and corners, performed strictly as prescribed by the manufacturer of the transparent colors.

6-23.80 TOP EDGE TREATMENT. After all legend has been applied, the sign panel shall be recycled in the heat and vacuum applicator for two minutes at a temperature of approximately 190°F under 21 inches of vacuum. When the sign panels have cooled, the top edge of each sign shall be covered with a clear, three-inch-wide transparent film (''Scotchcal'' #639 film or a CO-approved equivalent) with a sun-resistant, pressure-sensitive adhesive that does not turn yellow under exposure to ultraviolet radiation. Film shall be applied in lengths not to exceed 24 inches.

Where more than one piece is required, film shall be applied from each corner of the top edge toward the center of the top edge. End overlap of two inches or more shall be required where one film piece joins another.

6-24 SURFACES

6-24.10 SILKSCREENING. The screening of inks shall be as herein defined. All screen work shall be of high quality. Images shall be clean, crisp, and clear. The screen-inks shall be drawn over the screen with a firm, even pressure. As needed, three to five minutes shall be allowed for the ink to flow out so that it has a smooth surface.

6-25 DECALS AND MARKINGS

6-25.10 ANTIVANDALISM DECALS. The decal shall be installed on the back bottom left corner of the sign. Decals will be supplied by the National Park Service.

6-25.20 MAKER'S MARK. Each sign shall be permanently marked on the lower right corner of the back side with the month and year of manufacture and a suitable

maker's mark. The maker's mark shall be applied prior to painting in event sign back is to be painted.

6-25.30 INSTALLATION DATE MARK. Each sign shall be permanently marked near the lower right corner of the back side with the month and year of installation, by the sign installer.

6-26 METHOD OF MEASUREMENT. Where signs shown in the Schedule of Items list the unit as *square foot*, signs shall be measured for the actual square footage of surface area on each reflectorized face of the sign to the nearest ½ square foot, completed and accepted.

The Method of Measurement for other signs where the unit is listed as *each* shall be the actual number of signs, completed, and accepted.

6-27 BASIS OF PAYMENT. The quantities, determined as provided in Section 6-26, shall be paid for at the contract price per unit of measurement for each of the particular pay items listed.

Price and payment shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals needed to complete the work prescribed in the specifications.

6-30 ROUTED WOOD SIGNS

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6-30 ROUTED WOOD SIGNS

6-31 ROUTED SOLID WOOD SIGNS

6-31.10 DESCRIPTION. This specification applies to the furnishing of routed solid wood signs as ordered on the attached requisition. This work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct, package, and ship the signs via Government Bill of Lading or Parcel Post.

6-31.20 MATERIALS

6-31.21 Dimensional Lumber. Dimensional lumber should be kiln-dried, vertical grain with maximum moisture content of 19 percent. Nominal thickness and type of lumber shall be specified by Contracting Officer (CO). Recommended types include:

(1) Clear vertical grain heart redwood with maximum moisture content of 12%,

(2) Western red cedar, B or better grade, selected for vertical grain, with maximum moisture content of 19%,

(3) Red or White oak, rough sawn, air dried, hardwood lumber grade No. 1 common or better (used for trail signs only).

6-31.22 Adhesive. Adhesive shall be (1) a phenolic resin glue waterproof to 180°F., Bordon Chemical "Wonderbond" W-926A; (2) an all solids (without extender or thinner) epoxy adhesive, Chem-Tech T-88; (3) an urea-formaldehyde thermosetting resin glue conforming to Federal Specifications MMM-A-188C (e.g. Weldwood Plastic Resin) or CO-approved equivalent.

6-31.23 Paints. Primer and finish coats for sign backs, faces, edges, and lettering shall be Benjamin Moore's ready-mixed, exterior type, PENTAFLEX, or CO-approved equivalent. Color for backs, faces and edges of signs shall be Federal Standard 595a Color No. 20059(brown). Color for lettering shall be Federal Standard 595a Color No. 17875(white). Thinner and solvent shall be as recommended by the manufacturer.

6-31.24 Stain and Sealer.

6-31.24a Gray Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 908 or CO-approved equivalent, and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-31.24b "Redwood" Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 717 or CO-approved equivalent and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-31.24c Dark Brown Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 725 or CO-approved equivalent and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-31.24d Bleaching Oil. Shall be Cabot's Bleaching oil or CO-approved equivalent.

6-31.25 Metal Rod. Shall be steel, all thread rod, ½ inch diameter, minimum 36 inches in length.

6-31.26 Wood Dowel. Shall be ⅜ inch diameter maple wood dowel maximum 36 inches in length.

6-31.27 Plywood Backing (Optional). Shall be ⅜ inch exterior-grade plywood.

6-31.30 CONSTRUCTION. Construction shall be of high quality with no internal or visible defects in the finished product. Dimensions and corner radii shall be as specified on attached drawings, with an allowable tolerance of ± ¼ inch. When the

first order is placed, the Contractor shall complete a sample signboard and submit it to the CO for approval before proceeding with further construction.

6-31.31 Dimensional Lumber. Sign panels shall be fabricated from boards not more than eight inches nor less than four inches in width. End grain on each board shall be reversed to minimize checking and sign warpage. Joined boards shall match on all surfaces within a tolerance of 1/32 inch. Vertical joints shall not be used.

6-31.32 Doweling (Optional). When used, holes for doweling shall be machine drilled through boards 16 inches on center starting three inches in from edge. Holes shall be oversized 1/16 inch. When vertical dimension is 36 inches or less a wood dowel shall be used.

When vertical dimension is greater than 36 inches, a metal dowel shall be used and counter sunk one inch and plugged.

6-31.33 Preparation of Surface Joints. Wood surfaces to be glued shall be smooth and true, free from machine-jointing marks and chipped or loosened grain. Glueline surfaces shall be free from dust, grease, and other foreign matter.

6-31.34 Temperatures. Boards to be joined by gluing shall be stacked on stickers at air temperatures between 70°F and 90°F for not less than 24 hours prior to gluing. During the glue application and curing processes, air temperatures shall be not less than 70°F nor more than 90°F.

6-31.35 Glue Application. Glue shall be applied in accordance with manufacturer's recommendations to the entire surface of each joint face. Maximum allowable time between start of glue application and final setting of clamps on the sign panel shall be in accordance with manufacturer's recommendations.

6-31.36 Clamping and Curing. Clamping pressure and curing times shall conform to manufacturer's recommendations. Allow to cure 48 hours prior to any machining.

6-31.37 Machining. All cuts and drilling shall be accurate and clean. Table saws shall be set so that the blade extends through the panel not less than ½ inch. Drilling should be done with high-speed drills to avoid chipping.

6-31.38 Edge Rounding. Following the cutting of sign panel to size, all face and back edges shall be rounded to a radius to 1/8 inch.

6-31.39 Plywood Backing (Optional). Following gluing and curing of dimensional lumber, the plywood shall be cut to match the sign backs and glued and clamped in place. Clamping pressure and curing times shall comform to manufacturer's recommendations.

6-31.40 LEGEND: LAYOUT AND TOLERANCES

6-31.41 Graphic Layout. Graphic layout shall be as shown on attached drawings. Artwork is to be accurately reproduced, enlarged in size to meet diminsions shown on scaled drawings. Allowable reproduction tolerance is ± ½%. An accurate grid shall be used to insure layout is level and plumb.

6-31.42 Horizontal Alignment. Letters, numerals, and symbols shall be horizontally aligned to a tolerance of ± 1/16 inch. Test method for horizontal alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line on the sign, In each line, letters shall not vary more than 1/16 inch from that line.

6-31.43 Vertical Alignment. Letters, numerals, and symbols shall be vertically aligned to a tolerance of ± 1/16 inch. Test method for alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line of the sign. Place a square along the straightedge; individual letters shall be normal to the square with a tolerance of 1/16 inch.

6-31.44 Routing. Routed letters and graphics on signs shall be the size specified on supplementary drawings. Letters shall be NPS Modified Clarendon letter style or as noted on contract drawings. All letters and graphics shall be machine-routed with a v-grooved or oval-sided flat-bottom bit. One inch letters and smaller shall be routed 1/8 inch to 3/16 inch depth, letters 1 1/2 inches and larger shall be routed 1/4 inch to 3/8 inch depth or as specified on drawings. Routing depth shall be consistent for each letter size on any one sign.

6-31.50 FINISHING

6-31.51 Sanding. All burrs on edges or routed channels shall be removed by sanding with the grain of the wood. Final sanding shall be with an 80 or 100 medium-grit sandpaper and shall leave the sign face, back, and edges smooth without gouge marks.

6-31.52 Cleaning. All sign surfaces shall be wiped, airblown, or vacuumed clean before painting or staining to insure removal of sawdust.

6-31.53 Maker's Mark. Sign manufacturer shall mark the lower right corner of the back of each sign, identifying manufacturer and manufacturing date.

6-31.54 Painting. All painting shall be accomplished in a well-ventilated, dust-free paint room separated by full partitions from shop woodworking areas. Paint shall be applied and allowed to cure at air temperatures specified by the manufacturer. Paint shall be thoroughly mixed prior to each use and at frequent intervals during use to insure against pigment separation. Paint shall be applied to all surfaces in a minimum of four coats to provide a dry paint film thickness of 4 mils $\pm$ 0.5 mil. Color schedule shall be as specified on supplementary drawings.

Two coats shall be applied by brush or spray to provide continuous primer across all sign surfaces. Finish paint in routed areas of sign face shall be applied by brush, spray or puddling, providing coverage of entire vertical portion of routed areas. Finish paint on sign face, back, and edges shall be applied by spray or roller. A short nap roller is recommended to prevent paint from dripping into routed areas. Drying time between coats shall be specified by the paint manufacturer.

Signs which show alligatoring, nicks or slopping of paint in and around routed areas shall be rejected.

6-31.55 Staining (Optional). All surfaces shall receive a minimum two coats of stain. Color schedule shall be as specified on supplementary drawings. Stain shall be liberally and uniformly applied to the edges, back, and face of the sign by brush or roller, and to routed surfaces by brushing. Stain shall be thoroughly mixed prior to each use and at frequent intervals during use to insure against pigment separation. All stain is to be thoroughly brushed in. Excess stain remaining shall then be removed by wiping.

6-31.56 Natural Weathered (Optional).

6-31.56a Wire Brushing. Face of panel shall be mechanically brushed in the direction of the wood grain to remove the soft wood grains to a nominal depth of $\pm$ 1/8 inch.

6-31.56b Bleaching Oil. Oil shall be applied and allowed to cure according to manufacturer's specifications.

6-31.60 METHOD OF MEASUREMENT. Where the Schedule of Items lists the unit as *square foot*, measurement shall be made for the actual square footage of surface area on the face of each sign, measured to the nearest 1/2 square foot, completed and accepted. The method of measurement for other signs where the unit is listed as *each* shall be the actual number of signs completed and accepted.

6-31.70 BASIS OF PAYMENT. The quantities shall be paid for at the contract price per unit of measurement for each of the particular pay items listed, which pay-

ment shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals needed to complete the work prescribed in the specifications.

6-32 ROUTED HDO PLYWOOD SIGNS

6-32.10 DESCRIPTION. This specification applies to the furnishing of routed HDO plywood signs as ordered on the attached requisition. This work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct, package, and ship the signs via Government Bill of Lading or Parcel Post.

6-32.20 MATERIALS

6-32.21 HDO Plywood. Plywood shall be ¾ inch thick, 7-ply, marine A-A face, all Douglas Fir grade B or better core, and otherwise conform to U.S. Product Standard PS1-74. Each plywood sheet shall be branded as follows:

HDO-AA-G1 Marine-APA-PS1-74

Sign panels which are warped or show signs of checking, splits, open joints, loose knots or other surface defects shall be rejected.

6-32.22 Paints. Primer and finish coats shall be Benjamin Moore's ready-mixed, exterior type, PENTAFLEX or Contracting Officer (CO)-approved equivalent. Color for backs, faces, and edges of signs shall be Federal Standard 595a Color No. 20059(brown). Color for lettering shall be Federal Standard 595a Color No. 17875(white). Thinner and solvent shall be as recommended by the paint manufacturer.

6-32.30 CONSTRUCTION. Construction shall be of high quality with no internal or visible defects in the finished product. Dimensions and corner of radii shall be as specified on attached drawings, with an allowable tolerance of ± ¼''. When the first order is placed, the Contractor shall complete a sample signboard and submit it to the CO for approval before proceeding with further construction.

6-32.31 Storage and Handling. Panels shall be stacked flat in an enclosed and well-ventilated building. Stored plywood shall not be placed directly on dirt or concrete surfaces. Care shall be used in handling plywood to prevent damage to corners, edges, and faces. Damaged plywood panels shall be rejected.

6-32.32 Board Joining. No board joining shall be allowed for routed HDO plywood signs.

6-32.33 Machining. All cuts and drilling shall be accurate and clean. Panels shall be fed through saws slowly to avoid damage to the overlay. Table saws shall be set so that the blade extends through the panel not less than ½ inch. Drilling should be done with high speed drills to avoid chipping of the back of sign.

6-32.34 Coregap Filling. Edge coregap holes shall be filled with Mameco International Vulcan 116 polyurethane sealant, Thiokol Pecora Synthacalk GC-9 polysulfide sealant, or CO-approved equivalent to produce a flat, gap-free surface. Edge filler shall be cured in accordance with manufacturer's recommendations, and then sanded smooth.

6-32.35 Edge Rounding. All face and back edges shall be rounded to a radius of 1/16 inch.

6-32.40 LEGEND: LAYOUT AND TOLERANCES

6-32.41 Graphic Layout. Graphic layout shall be as shown on attached drawings. Artwork is to be accurately reproduced, enlarged in size to meet diminsions shown on scaled drawings. Allowable reproduction tolerance is ± ½%. An accurate grid shall be used to insure layout is level and plumb.

6-32.42 Horizontal Alignment. Letters, numerals, and symbols shall be horizontally aligned to a tolerance of ± 1/16 inch. Test method for horizontal alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line on the sign. In each line, letters shall not vary more than 1/16 inch from that line.

6-32.43 Vertical Alignment. Letters, numerals, and symbols shall be vertically aligned to a tolerance of ± 1/16 inch. Test method for alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line of the sign. Place a square along the straightedge; individual letters shall be normal to the square with a tolerance of 1/16 inch.

6-32.44 Routing. Routed letters and graphics on signs shall be the size specified on the supplementary drawings. Letters shall be NPS Modified Clarendon style or as noted on drawings. All letters and graphics shall be machine-routed with an oval-sided flat-bottom bit. Routing depth shall be 1/16 inch.

6-32.50 FINISHING

6-32.51 Sanding. Prior to painting, sign face, back, and panel edges shall be sanded with 50 to 60 grit sandpaper. Sanding shall leave surfaces smooth without gouge marks.

6-32.52 Maker's Mark. Sign manufacturer shall mark the lower right corner of the back of each sign, identifying the manufacturer and manufacturing date.

6-32.53 Painting. All painting shall be accomplished in a well-ventilated, dust-free paint room separated by full partitions from shop woodworking areas. Paint shall be applied and allowed to cure at air temperatures specified by the paint manufacturer. Paint shall be thoroughly mixed prior to each use and at frequent intervals during use to insure against pigment separation. Paint shall be applied to all surfaces in a minimum of four coats to provide a dry paint film thickness of 4 mils ± ½ mil. Color schedule shall be as specified on supplementary drawings.

Two coats shall be applied by brush or spray to provide continuous primer across all sign surfaces. Finish paint in routed areas of sign face shall be applied by brush, spray or puddling, providing coverage of entire vertical portion of routed areas. Finish paint on sign face, back and edges shall be applied by spray or roller. A short nap roller is recommended to prevent paint from dripping into routed areas. Drying time between coats shall be as specified by the paint manufacturer.

Signs which show alligatoring, nicks, or slopping of paint in and around routed areas shall be rejected.

6-32.60 METHOD OF MEASUREMENT. Where the Schedule of Items lists the unit as *square foot*, measurement shall be made for the actual square footage of surface area on the face of each sign, measured to the nearest ½ square foot, completed and accepted. The method of measurement for other signs where the unit is listed as *each* shall be the actual number of signs completed and accepted.

6-32.70 BASIS OF PAYMENT. The quantities shall be paid for at the contract price per unit of measurement for each of the particular pay items listed, which payment shall be full compensation for furnishing all materials, labor, equipment, tools, and the incidentals needed to complete the work prescribed in the specifications.

6-33 ROUTED WOOD FOAM CORE SIGNS

6-33.10 DESCRIPTION. This specification applies to the furnishing of wood signs with a rigid polyurethane foam core construction signs as ordered on the attached requisition. Work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct, package, and ship the signs via Government Bill of Lading or Parcel Post.

6-33.20 MATERIALS

6-33.21 Dimensional Lumber. Dimensional lumber for face panels, back panels, wood blocking (if any), and edge closeout shall be **one** of the following, as specified on the attached requisition:

(1) Clear vertical grain heart redwood with maximum moisture content of 12%,

(2) Western red cedar, B or better grade, selected for vertical grain, with maximum moisture content of 19%.

Nominal thickness of lumber for use in face and back panels shall be 1 inch. Edge core closeout material shall be 1½'' thick, unless otherwise specified on the attached requisition. The grain pattern in every piece of wood shall be aligned with that of the surface panels.

6-33.22 Foam Core. The core shall be 1½'' thick high density rigid polyurethane foam, Last-A-Foam FR-3704 (General Plastics Mfg. Co., Tacoma, Washington) or Contracting Officer (CO)-approved equivalent.

6-33.23 Adhesive. Adhesive (glue) shall be an urea-formaldehyde thermosetting resin adhesive conforming to Federal Specifications MMM-A-118C (e.g. Weldwood Plastic Resin) or CO-approved equivalent.

6-33.24 Stain and Sealer/Marine Oil

6-33.24a Gray Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 908 or CO-approved equivalent, and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-33.24b ''Redwood'' Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 717 or CO-approved equivalent, and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-33.24c Dark Brown Stain. Shall be composed of the following mixture: Three (3) parts Olympic Semitransparent Stain No. 725 or CO-approved equivalent, and one (1) part of Cabot's Colorless Creosote No. 230 or CO-approved equivalent.

6-33.24d Sealer/Marine Oil Application. Shall consist of Deks Olje #1 (matte finish) or Deks Olje #2 (gloss finish) or CO-approved equivalent.

6-33.30 CONSTRUCTION. Construction shall be of high quality with no internal or visible defects in the finished product. Dimensions and corner radii shall be as specified on attached drawings, with an allowable tolerance of ± ¼ inch. When the first order is placed, the Contractor shall complete a sample signboard and submit it to the CO for approval before proceeding with further construction.

6-33.31 Preparation of Front and Back Panels.

6-33.31a Dimensional Lumber. Sign panels made of dimensional lumber shall be fabricated from boards not more than eight inches nor less than four inches in

width. Boards shall be butt jointed, reversing end grain on each board to minimize checking and sign warpage. Joining boards shall match on all surfaces. Vertical joints shall not be used.

6-33.31b Preparation of Surface Joints. Wood surfaces to be glued shall be smooth and true, free from machine-jointing marks, chipped or loosened grain, dust, grease, and other foreign matter.

6-33.31c Temperatures. Boards to be joined by gluing shall be stacked on stickers at air temperatures between 70 °F and 90 °F for not less than 24 hours prior to gluing. During the glue application and curing processes, air temperatures shall be not less than 70 °F nor more than 90 °F.

6-33.32 Preparation of Core

6-33.32a Edge Core. Edge core lumber shall be cut to fit periphery of the rear panel.

6-33.32b Foam Core Preparation. Foam core shall be cut to snug fit in cavity formed by edge core with no voids. At each point indicated in supplemental drawings, foam shall be cut to accommodate wood blocks, to fit exactly with no voids.

6-33.33 Assembly. Fabrication is to resemble the construction of a shallow box formed by the glued up back panel, to which is glued the edge closeout stock. Rigid polyurethane foam sheet stock is cut to fit closely into the cavity formed by edge closeouts, and glued all around and to back panel. Any wood blocking shown on drawings shall be inserted into foam core previously cut for that purpose, and shall be glued all around and to back panel. The box is then closed by glueing face panel to the foam core, any wood blocks and edge closeouts (see figure #1). The procedure is to be one continuous glueing operation, conducted within the allowable working time of the specified adhesive.

6-33.33a Glue Application. Glue shall be applied according to glue manufacturer's recommendations to the entire surface of each glue joint. Maximum allowable time between start of glue application and final setting of clamps on the sign panel shall be in accordance with glue manufacturer's recommendations.

6-33.33b Final Clamping and Curing. Clamping pressure and curing times shall be in accordance with glue manufacturer's recommendations.

6-33.34 Machining. All cuts and drilling shall be accurate and clean. Table saws shall be set so that the blade extends through the panel not less than ½ inch. Drilling should be done with high-speed drills to avoid chipping.

6-33.35 Edge Rounding. Following the fabrication of the panel, all edges on the sign shall be rounded to a radius of ⅛ inch.

6-33.40 LEGEND: LAYOUT AND TOLERANCES

6-33.41 Graphic Layout. Graphic layout shall be as shown on attached drawings. Artwork is to be accurately reproduced, enlarged in size to meet dimensions shown on scaled drawings. Allowable reproduction tolerance is ± ½ %. An accurate grid shall be used to insure layout is level and plumb.

6-33.42 Horizontal Alignment. Letters, numerals, and symbols shall be horizontally aligned to a tolerance of ± 1/16 inch. Test method for horizontal alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line on the sign. No letter shall vary more than 1/16 inch from that line.

6-33.43 Vertical Alignment. Letters, numerals, and symbols shall be vertically aligned to a tolerance of ± 1/16 inch. Test method for alignment is as follows:

Place a metal straightedge along the bottom of a series of letters forming one line of the sign. Place a square along the straightedge; individual letters shall be normal to the square with a tolerance of 1/16 inch.

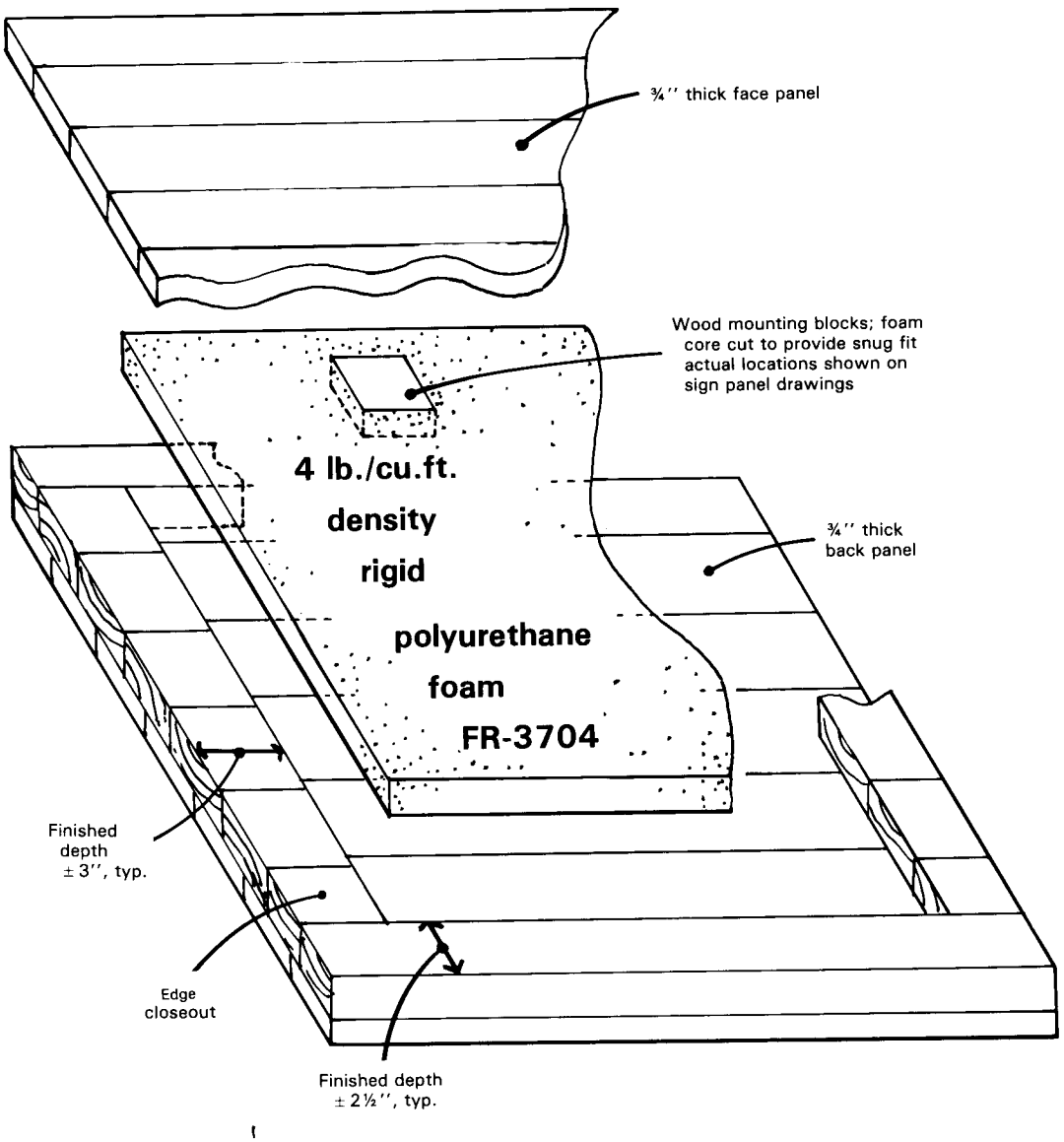


Figure 1. Typical rigid polyurethane foam core sign panel (exploded view)

6-33.44 Routing. Routed letters and graphics on signs shall be the size specified on the supplementary drawings. Letters shall be NPS Modified Clarendon style or as shown on attached drawings. All letters and graphics shall be machine routed with a V-grooved or oval-sided flat-bottom bit. Routing depth shall be ¼'' ± 1/16'' and shall be consistent for all routing on any one sign.

6-33.50 FINISHING

6-33.51 Sanding. All burrs on edges of routed channels shall be removed by sanding with the grain of the wood. Final sanding shall be with an 80 or 100 medium-grit sandpaper and shall leave the sign face, back, and edges smooth without gouge marks.

6-33.52 Cleaning. All sign surfaces shall be wiped, airblown, or vacuumed clean before staining or oiling to insure removal of sawdust.

6-33.53 Maker's Mark. Sign manufacturer shall mark the lower right corner of the back of each sign, identifying the manufacturer and manufacturing date.

6-33.54 Staining. All surfaces shall receive at least two coats of stain, allowing a minumum 24 hours drying time between applications. Color schedule shall be as specified on supplementary drawings. Stain shall be liberally and uniformly applied to the edges, back, and face of the sign by brush or roller, and to routed surfaces by brushing. Stain shall be thoroughly mixed prior to each use and at frequent intervals during use to insure against pigment separation. All stain is to be thoroughly brushed in. Excess stain remaining shall then be removed by wiping. Signs shall be dried face-up a minimum of 24 hours before sealing and packaging.

6-33.55 Sealer/Marine Oil Application. Oil finish shall be applied in a dust-free area, and according to the recommendations of the product manufacturer. Matte finish or glossy finish shall be specified on the supplementary drawings or on the attached requisition.

6-33.60 METHOD OF MEASUREMENT. Where the Schedule of Items lists the unit as *square foot*, measurement shall be made for the actual square footage of surface area on the face of each sign, measured to the nearest ½ square foot, completed and accepted. The method of measurement for other signs where the unit is listed as *each* shall be the actual number of signs completed and accepted.

6-33.70 BASIS OF PAYMENT. The quantities shall be paid for at the contract price per unit of measurement for each of the particular pay items listed, which payment shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals needed to complete the work prescribed in the specifications.

6-40 NPS ARROWHEAD EMBLEMS

CONTENTS

6-40 NPS ARROWHEAD EMBLEMS

6-41 ROUTED WOOD EMBLEMS

6-41.10 DESCRIPTION. This specification applies to the furnishing of routed wood emblems as ordered on the attached requisition. This work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct, package, and ship the emblem via Government Bill of Lading or Parcel Post.

6-41.20 MATERIALS

6-41.21 Dimensional Lumber. Dimensional lumber shall be kiln-dried, vertical grain with maximum moisture content of 19 percent. Redwood, cedar, cypress or other durable stock shall be used. Recommended lumber includes:

(1) Clear vertical grain heart redwood with maximum moisture content of 12%,

(2) Western red cedar, B or better grade, selected for vertical grain, with maximum moisture content of 19%,

(3) Bald cypress, incense cedar or other wood as specified by the Contracting Officer.

Nominal thickness is to be two inches for sizes up to 21½'' x 27''. Emblems 14¼'' x 18'' and larger shall be backed with ⅜'' AC exterior grade plywood. Nominal thickness for emblems 30'' x 40'' and larger shall be 3''.

6-41.22 Plywood Backing(Optional). Plywood shall be ⅜'' thick, AC exterior grade.

6-41.23 Paint. Primer and finish coat for emblem backs, faces, edges graphics, and lettering shall be a catalized automotive enamel or Contracting Officer (CO)-approved equivalent. Color for background, edges and back shall be cocoa brown Federal Standard (F.S.) 595a Color No. 20233 (semi-gloss). Color for trees and buffalo shall be dark blue green, F.S. 595a Color No. 34058 (flat). Color for mountain tops and lake shall be cream, F.S. 595a Color No. 23690 (semigloss). Color for lettering shall be white, F.S. 595a Color No. 17875 (glossy). Specified color numbers are those found in Federal Standard 595a, dated January 2, 1968, Change Notice 1, January 2, 1968. Thinner and solvent shall be as recommended by the paint manufacturer. For improved durability, official colors may be specified as all glossy finish.

6-41.24 Adhesive. Adhesive shall be (1) a phenolic resin glue waterproof to 180°F, Borden Chemical ''Wonderbond'' W-926A; (2) an all solids (without extender or thinner) epoxy adhesive, Chem Tech T-88; (3) an urea-formaldehyde thermosetting resin glue conforming to Federal Specification MMM-A-188C (e.g. Weldwood Plastic Resin) or CO-approved equivalent.

6-41.30 CONSTRUCTION. Construction shall be of high quality with no internal or visible defects in the finished product. Dimensions shall be as specified on attached drawings, with an allowable tolerance of ± ¼''. When the first order is placed, the Contractor shall complete a sample emblem and submit it to the CO for approval before proceeding with further construction. All joints between dimensional lumber boards shall be simple butt joints.

6-41.31 Preparation of Surface Joints. Wood surfaces to be glued shall be smooth and true, free from chips or loosened grain. Surfaces shall be free from dust, grease, and other foreign matter.

6-41.32 Temperature. During the glue application and curing process, air temperatures shall be not less than 70°F nor more than 90°F.

6-41.33 Glue Application. Glue shall be applied in accordance with manufacturer's recommendations to the entire surface of each joint face. Maximum allowable time between start of glue application and final setting of clamps on the sign panel shall be in accordance with manufacturer's recommendations.

6-41.34 Clamping and Curing. Clamping pressure and curing times shall conform to manufacturer's recommendations. Allow to cure 48 hours prior to any machining.

6-41.35 Coregap Filling. Edge coregap holes shall be filled with Mameco International Vulkem 116 polyurethane sealant, Thiolkol Pecora Synthacalk GC-9 polysulfide sealant, or CO-approved equivalent to produce a flat, gap-free surface. Edge filler shall be cured in accordance with manufacturer's recommendations, and then sanded smooth.

6-41.36 Chamfered Edges. Following the cutting of the emblem panel to size, all face edges shall be chamfered 45° to resemble the flaking of an arrowhead. Chamfer depths are determined by the chamfer width, which is fixed for each emblem size by the proporations shown on drawing no. PG-1005-A (see figure 2).

6-41.40 GRAPHIC LAYOUT. Graphic layout shall be as shown on attached drawing no. PG-1005-A (see figure 2). Artwork is to be accurately reproduced, enlarged in size to meet the specified vertical dimensions. Allowable reproduction tolerance is ± ½%. An accurate grid shall be used to insure layout is level and plumb.

6-41.41 Routing. Letters and graphics shall be routed in accordance with the following table.

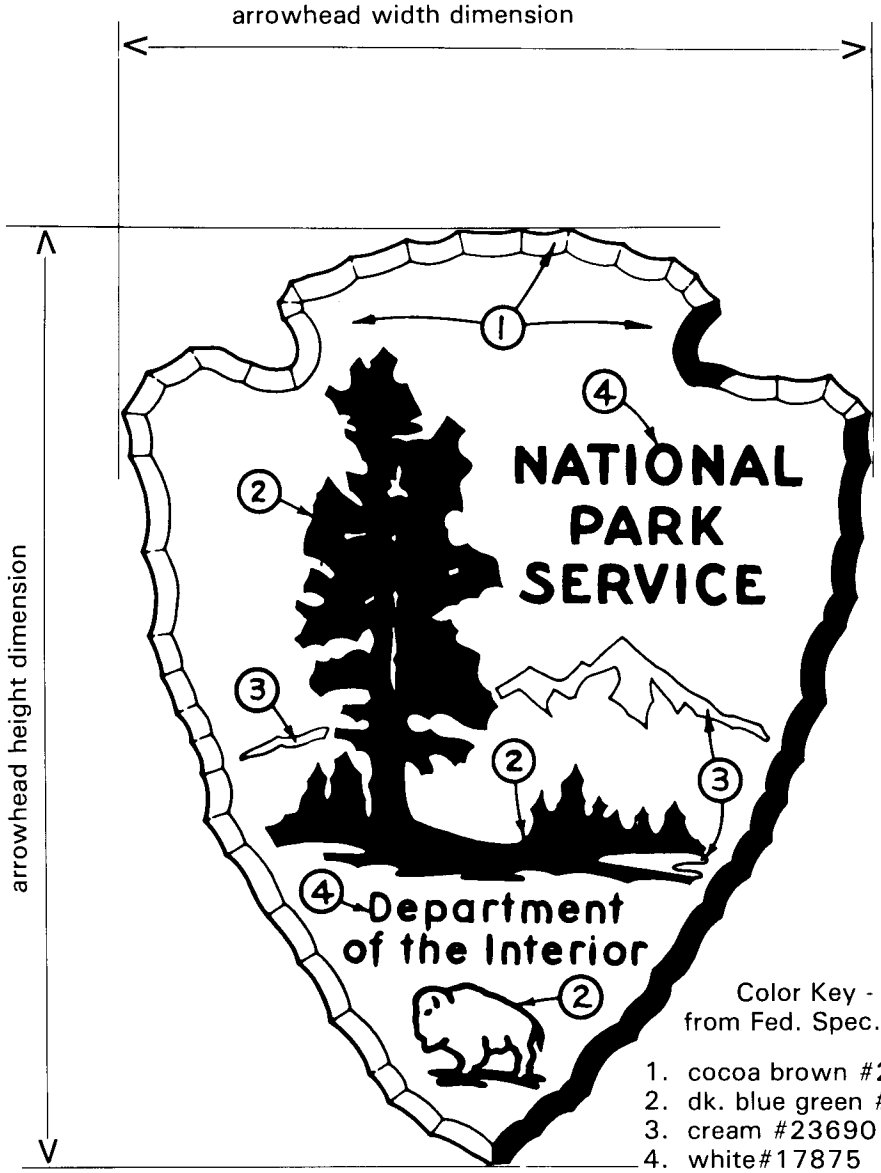
Emblem Size	Routing Depth
10'' x 8''	⅛''
12'' x 9½''	⅛''
15½'' x 12¼''	⅛''
18'' x 14¼''	¼''
27'' x 21½''	¼''
40'' x 31¾''	⅜''
and larger	⅜''

6-41.50 FINISHING.

6-41.51 Sanding. All burrs on edges or routed channels shall be removed by sanding with the grain of the wood. Final sanding shall be with an 80 or 100 medium-grit sandpaper and shall leave the sign face, back, and edges smooth without gouge marks.

6-41.52 Cleaning. All sign surfaces shall be wiped, airblown, or vacuumed clean before painting or staining to insure removal of sawdust.

6-41.53 Painting. All painting shall be accomplished in a well-ventilated, dust-free paint room separated by full partitions from woodworking areas. Paint shall be applied and allowed to cure at air temperatures specified by the manufacturer. Paint shall be thoroughly mixed prior to each use and at frequent intervals during use to insure against pigment separation. Paint shall be applied to all surfaces in a minimum of four coats to provide a dry paint film thickness of 4 mils ± ½ mil. Color schedule shall be as specified on supplementary drawing.



OFFICIAL NATIONAL PARK SERVICE EMBLEM

APPROVED: Conrad L. Wirth 3/20/54
DIRECTOR, NATIONAL PARK SERVICE DATE

Dwa. No. PG-1005-A

Figure 2

Two coats shall be applied by brush or spray to provide continuous primer across all sign surfaces. Finish paint in routed areas of sign face shall be applied by brush, spray or puddling, providing coverage of entire vertical portion of routed areas. Finish paint on sign face, back, and edges shall be applied by spray or roller. Short nap roller is recommended to prevent paint from dripping into routed areas. Drying time between coats shall be specified by the paint manufaturer.

Signs which show alligatoring, nicks, or slopping of paint in and around routed areas shall be rejected.

6-41.60 METHOD OF MEASUREMENT. The method of measurement for emblems where the unit is listed as *each* shall be the actual number of emblems completed and accepted.

6-41.70 BASIS OF PAYMENT. The quantities shall be paid for at the contract price per unit of measurement for each of the particular pay items listed, which payment shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals needed to complete the work prescribed in the specifications.

6-42 SILKSCREENED EMBLEM DECALS

6-42.10 DESCRIPTION. This specification applies to the furnishings of silkscreened emblem decals as ordered on the attached requisition. This work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct, package, and ship the emblem via Government Bill of Lading or Parcel Post.

6-42.20 MATERIALS.

6-42.21 Substrate.

6-42.21a Aluminum. The aluminum substrate shall be 6061-T6 and otherwise be in conformance with ASTM STD B-209. The thickness shall be 0.080 inches for all emblems.

6-42.21b Plywood. This shall be High Density Overlay (HDO), two sides, ¾-inch 7-ply, Douglas fir, exterior plywood, Product Standard PS 1-74, Group 1, with a B grade veneer on both faces. *Mill-oiled concrete form plywood shall be prohibited.* Surfacing overlay material weight shall be high density 60-60, non-oiled, resin impregnated fiber permanently fused to the base panel under heat and pressure. Panel weight shall be approximately 2.2 pounds per square foot. Overlay color shall be black. Each panel shall be edge-branded HDO B-B G1 EXT PS 1-74. The Contractor shall supply the CO with APA certification that the plywood meets all the above requirements.

6-42.22 Background Sheeting. Sheeting materials shall comply with "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects," FP-85 and Federal Specification L-S-300C. Contractor shall furnish certification that the materials comply with the requirements of FP-85 and L-S-300C. Contractor shall indelibly mark each carton of materials showing the date received. No more than 12 months shall have elapsed from date of purchase from the manufacturer to the date of application on substrate. Background sheeting shall be Type II, Class 1 or 2 and the color shall be white.

6-42.22a Reflective Emblem Colors. All of the following 3M Co. Screen Process inks or CO-approved equivalents, will be used as specified.

BORDER SHADOW: Opaque Black, No. 725

TREE: Green, No. CF 263

Color Formula for Green			*Weight*
Opaque Color	23-817 Lt. Green	.152	1 lb. 15¾ oz.
Opaque Color	23-805 White	.136	2 lb. 1½ oz.
Opaque Color	725 Black	.239	1 lb. 15¾ oz.
Opaque Color	23-872 Dk. Green	.473	5 lb. 0 oz.
			11 lb. 1 oz.

NOTE: May substitute Naz Dar #59-148 Dark Green.

BACKGROUND: Cocoa Brown, No. CF 890-3

Color Formula for Cocoa Brown			*Weight*
Transparent Color	713 Rustic Brown	.330	2 lb. 9½ oz.
Transparent Color	707 Toner	.650	5 lb. 4 oz.
Transparent Color	722 Yellow	.20	0 lb. 2½ oz.
			8 lb. 0 oz.

MOUNTAIN, LAKE, AND TEXT: White Reflective Sheeting.

6-42.22b Nonreflective Emblem Colors. All of the following screen process inks or CO-approved equivalent will be used as specified.

BORDER SHADOW: Screen Printing Process Color Black, No. 3905

TREE: Green, No. CF 144

Color Formula for Green		*Weight*
Screen Process Color	3914 Green	2 lb. 13 oz.
Screen Process Color	3902 Yellow	5 lb. 5¼ oz.
Screen Process Color	3903 White	3 lb. 7¾ oz.
Screen Process Color	3905 Black	2 lb. 7¾ oz.
		15 lb. 1¾ oz.

BACKGROUND: Brown, No. CF 596

Color Formula for Brown		*Weight*
Screen Process Color	3913 Orange	3 lb. 6 oz.
Screen Process Color	3903 White	3 lb. 13⅓ oz.
Screen Process Color	3912 Yellow	0 lb. 6¼ oz.
Screen Process Color	3905 Black	0 lb. 6¼ oz.
		11 lb. 7 oz.

MOUNTAIN AND LAKE: Cream, No. CF 2127 (Match Federal Standard No. 595a-23690)

Color Formula for Cream		*Weight*
Screen Process Color	3903 White	11 lb. 12 oz.
Screen Process Color	3902 Yellow	0 lb. 7 oz.
Screen Process Color	3905 Black	0 lb. ¼ oz.
Screen Process Color	3913 Orange	0 lb. ¼ oz.
		12 lb. 3½ oz.

TEXT: White Nonreflective Sheeting.

6-42.23 Treatment of Plywood Sign Edges

6-42.23a Wood Primer. The wood primer shall be as recommended by paint (enamel) manufacturer.

6-42.23b Enamel.. Benjamin Moore PENTAFLEX enamel or equal.

6-42.30 CONSTRUCTION

6-42.31 Workmanship. Construction shall be high quality with no visible defects in the finished product. Fabrication shall be in accordance with these specification, drawings, and detailed diagrams.

6-42.32 Preparing Plywood Panels for Sheeting

6-42.32a Sanding and Cleaning. Sign face overlay surface of each sign panel shall be sanded with 50 to 60 grit sandpaper on an orbital sander.

Overlay surfaces shall be clean. Edges shall be sanded prior to priming and painting. All panel edges shall be sanded clean. Finish sanding shall require a fine grit sandpaper. Coregap holes on the edge shall be filled with Mameco International Vulcan 116 polyurethane sealant, Thiokol Pecora Synthacalk GC-9 polysulfide sealant, or a CO-approved glazing compound to produce a flat, smooth surface.

6-42.32b Paint Room Facilities. Primer and enamel shall be applied and dried at an air temperature of not less than 65 °F in a well-ventilated, dust-free, enclosed paint room. The paint room shall be separated by full partitions from shop woodworking areas.

6-42.32c Priming and Enamel Application. Sign surfaces shall be clean and free of loose material prior to painting. All sign panel edges shall be primed and enameled. One coat of the specified primer (see Section 6-22.32) shall be applied to the

panel edges prior to application of reflective sheeting. One coat of the enamel shall be applied after application of reflective sheeting.
Cure time between enamel coats shall be as specified in writing by the manufacturer. Prime plus paint thickness shall provide a minimum of 2 mils ± ½ mil thickness of dry paint film.

6-42.32d Panel Face Cleaning. Successful adhesion of reflective sheeting is dependent upon a totally clean and well-scarified panel face to receive the adhesive. Before application of the sheeting, the face shall be free of all foreign matter such as paint or dust.

6-42.33 Metalworking. The aluminum shall be free of burrs and pits on both sides, including edges and holes, and shall be made ready for application of the sheeting.

6.42.33a Surface Preparation. The aluminum shall be thoroughly cleaned and degreased with solvent and alkaline emulsion cleaner by immersion, spray, or vapor degreasing and dried prior to application of the sheeting coat. The aluminum shall be new and corrosion-free with holes drilled or punched, and all edges smoothed prior to application of the sheeting.

6-42.34 Application Methods. The method of application of sheeting shall be precisely as prescribed in writing by the manufacturer of the sheeting.

The applicator shall have at least two pyrometers centrally attached. The applicator shall also have a cycle control unit approved by the sheeting manufacturer.

Temperature control calibration and accuracy monitoring of the approved cycle control unit shall be required each day that the heat and vacuum applicator is operated. "Teletemp Temperature Records" (temperature measuring devices) shall be used. Applicator operating temperature shall be calibrated with the specified temperature measuring device each day of operation, and:

1. Whenever different substrate materials are being used.
2. Whenever a diaphragm, light-bulb, cycle-control unit, or thermocouple is replaced.
3. Whenever different types or different colors of reflective sheeting are used.

The sheeting shall be precut to size or trimmed to the edges. The entire face of the panel shall be covered with one unspliced sheet.

Flexible sheeting shall be positioned to provide 1/8-inch to 5/32-inch overlap onto all panel edges after trimming. Use of two reflective faces on one panel (dual face) is prohibited.

6-42.35 Silkscreening. Screen processing shall be of careful workmanship with neat, clean lines and corners, performed strictly as prescribed by the manufacturer of the transparent or opaque colors. The screen inks shall be drawn over the screen with a firm, even pressure. As needed, three to five minutes shall be allowed for the ink to flow out so that it has a smooth surface.

6-42.40 LAYOUT. Exact layout to the specified size on attached requisition shall be produced by the Contractor by enlarging the attached drawing.

6.42.50 FINISHING. Not Applicable.

6-42.60 METHOD OF MEASUREMENT. The method of measurement for emblems where the unit is listed as *each* shall be the actual number of emblems completed and accepted.

6-42.70 BASIS OF PAYMENT. The quantities shall be paid for at the contract price per unit of measurement for each of the particular pay items listed, which payment shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals needed to complete the work prescribed in the specification.

6-50 PACKAGING, ORDERING, AND SHIPPING

CONTENTS

6-50 PACKAGING, ORDERING, AND SHIPPING

6-51 PACKAGING

6-51.10 ALL SIGNS. Signs protected as required below shall be packaged according to individual Areas. Signs ordered by two or more Areas shall not be placed in the same package.

The sign package shall be strapped with a viscose webbing strapping system, "Avistrap," or an equivalent approved by the Contracting Officer (CO), with not less than two straps, cinched down tight to prevent any movement or chafing.

After the bundle is strapped, the Contractor shall place a copy of the sign requisition and invoice in a heavily constructed envelope and attach it securely to the package.

The painted portions of signs, symbols, and shields shall be covered with slip sheets. Stained signs shall not be covered with slip sheets. All signs packaged together shall be turned face to face.

6-51.11 Reflective Sign Packaging. Signs shall be wiped clean prior to packaging.

Signs may be packaged singly or in multiples, provided that the individual weight of sign packages does not exceed 90 pounds. Signs may be packaged in fiberboard boxes, provided that the boxes conform to Federal Specifications PP-636-H; Type CF (corrugated fiberboard); Class - Domestic, Variety DW (double wall); Grade 275. Signs packaged separately shall have the sign face covered with ⅛ inch pressed board, smooth side toward the sign face.

Signs may be taped together prior to packaging with filament tape only if slip sheets completely cover the exposed surface of the signs prior to taping.

Sign faces, or a sign face and the pressed board, shall be separated by liners removed from reflective sheets (plastic side down), with the exception of Type III sheeting which shall be separated by 3M SCW 822 slip sheets or CO-approved equivalent.

6-51.12 Small Routed Wooden Sign Packaging. All sawdust shall be removed from the finish sign prior to packaging for shipment. The face of each sign shall be separated with corrugated packaging paper that meets Federal Specification PPP-P-291E, Type I (light duty), Style 1 (backing sheet mandatory). Signs shall be shipped in packages weighing not more than 65 pounds. Each package shall be wrapped in corrugated wrapping paper which meets Federal Specifications PPP-P-291E; Type III (heavy duty); Style 1 (backing sheet mandatory). Fiberboard boxes may be used as specified in 6-51.11.

6-51.13 Large Routed Wooden Sign Packaging. Signs shall be packaged separately. Required arrowhead emblems or logo plaques shall be included with each sign and shall be strapped, or otherwise affixed securely to a cleat and faced against the back of the sign.

All signs shall be packaged with the smooth side of the ⅛ inch thick nontempered, pressed board covering the sign face. The pressed board shall be well-secured with 4-penny, cement-coated nails, to the protective strips nailed to the signboard edges. Protective strips of nominal 2" x 4" lumber shall be extended past all sign board corners so as to join for nailing.

The package shall then be wrapped with corrugated wrapping paper as specified in 6-51.12.

6-52 SHIPPING

6-52.10 FROM COMMERCIAL SOURCES. Shipments shall be via Government Bill of Lading (GBL), or by the most economical method, such as Parcel Post, prepaid, and added as a separate item on the invoice.

6-60 APPLICABLE DOCUMENTS, PUBLICATIONS, AND STANDARDS

CONTENTS

6-60 APPLICABLE DOCUMENTS, PUBLICATIONS, AND STANDARDS

6-61 DESCRIPTION The following documents are a part of these specifications to the extent specified and as currently amended.

6-61.10 FEDERAL SPECIFICATIONS AND STANDARDS

Standard or Specification	Description
QQ-S-775	Steel sheets, carbon, zinc-coated.
FS-595a	Colors.
TT-P-25E	Primer Coating, exterior (undercoat for wood ready-mixed, white and tints).
FED-STD-141	Paint, varnish, lacquer, and related materials. Method of inspection, sampling and testing.
L-S-300C	Sheeting and tape, reflective and nonreflective; nonexposed lens, adhesive backing.
MMM-A-181C	Adhesive, phenol resorcinol, or malamine base.
TT-C-1060A	Coating, compound, reflective.
TTS-S-708A	Stain, oil: semi-transparent, wood, exterior.
PPP-B-636H	Boxes, shipping fiberboard.
PPP-P291 E	Paperboard, wrapping, and cushioning.

6-61.20 MILITARY SPECIFICATIONS AND STANDARDS

Standard or Specification	Description
MIL-43719 and MIL-M-43719	General Specifications for adhesive, elastomeric, and pigmented marking materials and markers.

6-61.30 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

Includes (1) Standard Alphabets for Highway Signs, (2) Standard Highway Signs Book and, (3) Specifications for Standard Highway Sign Colors.

Copies of the above MUTCD and the Standard Highway Signs Book are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20403. The subsidiary documents (Standard Alphabets for Highway Signs and Specifications for Standard Highway Sign Colors) are available from the Federal Highway Administration, Office of Traffic Operations, Washington, D.C. 20590.

6-61.40 OTHER

Standard or Specification	Description
U.S.-PS-1-74	U.S. Products Standard No. 1-74; for softwood plywood, construction and industrial (Application for copies should be addressed to the Products Standards Section, National Bureau of Standards, Washington, D.C.).

ASTM-STD-B-208	American Society of Testing and Materials. (Application for copies should be addressed to the Executive Secretary, American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103)
APA Test STD	American Plywood Association Test Standard Preliminary Tests for Exterior Coatings. (Application for copies should be addressed to the Executive Secretary, American Plywood Association, 119 A St., Tacoma, Washington 98401.
FP-85	Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, Section 718. Copies of Section 718 are available from the Federal Highway Administration, Office of Traffic Operations, Washington, D.C. 20590.
LM-PB	Product Bulletin for Colors and Clears.
LM-IF	Color Application Installation.
CS 122-60	U.S. Commercial Standards.
CS 259-63	U.S. Commercial Standards.

6-70 QUALITY CONTROL

CONTENTS

6-70 QUALITY CONTROL

6-71 PLYWOOD

6-71.10 PLYWOOD TESTS. The Contractor shall furnish copies of the vendor's invoice for the plywood, including certification that the plywood meets the following test requirements.

6-7l.11 Contamination Test. The plywood contamination test panels shall be cut three inches long and two inches wide. The panels shall be wiped with a tack rag to remove any dust or loose particles, and then the required reflective sheeting shall be applied to both faces of the panels. The test panels shall be conditioned for 24 hours at room temperature (75 °F), and then placed in a pressure vessel and held submerged in cold tap water. A vacuum of 24 inches of mercury shall be drawn and maintained for 45 minutes, followed immediately by the application of 40 to 50 psi of water pressure for 45 minutes.

NOTE: Proper test procedures are assured if the panel does not float after the above treatment.

Test panels shall then be removed from the pressure vessel and each placed in a glass container (400 ml beaker) containing approximately 50 ml of water. The beaker shall then be covered with a glass lid, such as a petri dish, and placed in an oven at 150 ° for 24 hours. At the end of the 24 hour interval, remove the panel from the oven, wipe the sheeting surface to remove any residue, and visually examine for deterioration. Any evidence of staining, discoloration, or other degradation of the applied sheeting shall constitute failure of the plywood to comply with the specification.

6-71.12 Adhesion Test. Panels of the plywood selected for adhesion testing shall be cut approximately one foot square. The application surfaces of the panels shall be cleaned. The reflective sheeting or film shall be cut to the appropriate size for completely covering the prepared, dust-free plywood surface in accordance with the recommendations of the sheeting or film manufacturer. The panels shall be subjected to accelerated conditioning in an oven for one hour at 150 °F, then cooled to room temperature. The sheeting or film shall be struck with a test spatula, using short, sharp jabs. The adhesive bond shall resist removal other than in small pieces at the point of spatula impact.

NOTE: Plywood (HDO) shall be certified for adhesion and shall be free of contamination in compliance with PS-1-74 and the applicable American Plywood Association (APA) requirements. This certification is to ensure that the high density overlay is of a suitable quality for application of reflective sheeting and paint.

6-72 TEMPERATURE CALIBRATION

6-72.10 HEAT AND VACUUM APPLICATOR. Teletemp Temperature Recorders (temperature-measuring devices) shall consist of a graded series of three heat-sensitive papers calibrated at 180 °, 190 °, and 200 °F to measure temperature accurately by means of a change in color. Each paper shall show an irreversible color change from white to black at a specific temperature. Accuracy of color change shall be within two percent of indicated temperature. Stored indicators shall be kept clean, dry, and at less than 80 °. Response time shall not exceed two seconds. See the following procedures and tables.

6-72.20 TEST PROCEDURE.

1. Allow the applicator temperature control to warm up at least ½ hour.
2. Allow the heat and vacuum applicator to warm up by running at least two complete cycles.
3. Peel teletemp temperature measuring device from tape backing. Place device on top of sign face, on an unscreened section of the material.
4. Place the test sign face in the heat and vacuum applicator, near the center of the diaphragm and under the thermister.
5. Place a slip sheet, glossy side down, over the sign face. Turn the vacuum on. Lower the diaphragm. Adjust sign face position so that the temperature measuring device is not on a diaphragm seam or under the thermister-patched area.
6. Run a complete cycle. Remove the test sign face. Compare temperature measuring device readings to the following table. Make adjustments as indicated.
7. Remove the temperature measuring device from the sign face. Place the device on the calendar for the corresponding day. Place all devices used for test evaluations on the calendar.

Temperature-Measuring Device Reading	**Action Required For Sheeting**	
	Type II	Type III
None blacked out	Temperature is too low. Increase temperature and re-run test.	Temperature is too low. Increase temperature and re-run test.
80 °F blacked out	Temperature is too low. Increase temperature and re-run test.	Temperature is in correct range.
80 °F, 190 ° blacked out	Temperature is too low. Increase temperature and re-run test.	Temperature is too high. Decrease temperature and re-run test.
80 °, 190 °, and 200 °F blacked out	Temperature is within correct range.	Temperature is too high. Decrease temperature and re-run test.

NOTE: For 5 by 12 foot applicator only.

6-73 PAINT

6-73.10 PAINT THICKNESS. Dry film thickness shall be tested periodically by use of a commercial film thickness tester. Such test results by the Contractor shall be furnished to the Contracting Officer (CO) upon request.

6-74 CERTIFICATION

6-74.10 MATERIALS CERTIFICATION. It is the responsibility of the sign Contractor to obtain materials certification from each manufacturer of substrates, adhesives, sheeting, and coatings, and to see that the material meets all requirements as specified in this and related documents.

The sign Contractor shall also provide certification that the finished product meets all of the requirements specified in this document and that all other certifications are on file and available to the CO on request.

6-75 INSPECTION AND ACCEPTANCE

6-75.10 SIGNS ORDERED FROM COMMERCIAL SOURCES. Inspection and acceptance shall be in accordance with the General Provisions, Standard Form 23A.

6-76 GUARANTEE

6-76.10 REFLECTORIZED SIGNS. The Contractor shall warrant the materials and workmanship of each sign in accordance with the maximum limits of material warranties extended by manufacturers of raw materials, subject to the conditions they specify, and the production specifications provided by the National Park Service. In general, signs are expected to maintain a useful life span of at least five years. When sign failure occurs prior to five years and an inspection demonstrates that the failure is caused by materials warranted to Contractor to endure at least that long, the sign will be replaced or repaired free of materials charges. When failure occurs and inspection demonstrates that such failure is due to poor workmanship, the sign will be replaced or repaired at Contractor's expense, including shipping charges.

6-76.20 ROUTED WOOD SIGNS. Contractor shall guarantee materials and workmanship of signs for two years from the date of the maker's mark. Contractor shall be liable for total replacement cost of signs including materials, fabrication costs and shipping, at the time of failure of original materials and/or workmanship.

6-80 MISCELLANEOUS APPURTENANCES

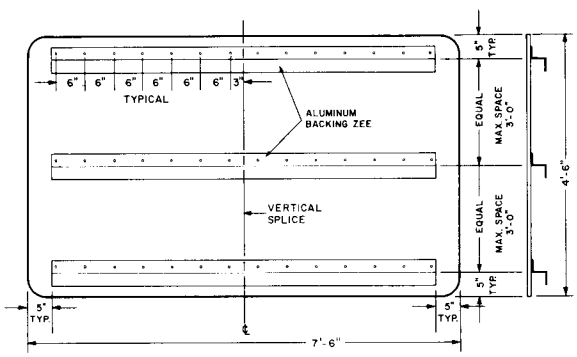
CONTENTS

6-80 MISCELLANEOUS APPURTENANCES

6-81 DESCRIPTION. This item shall consist of furnishing the specified hardware materials as ordered on the sign requisitions. This work shall include the furnishing of all materials, labor, tools, equipment, and supplies to construct; packaging for shipping; obtaining carrier; and shipping the signs via Government Bill of Lading.

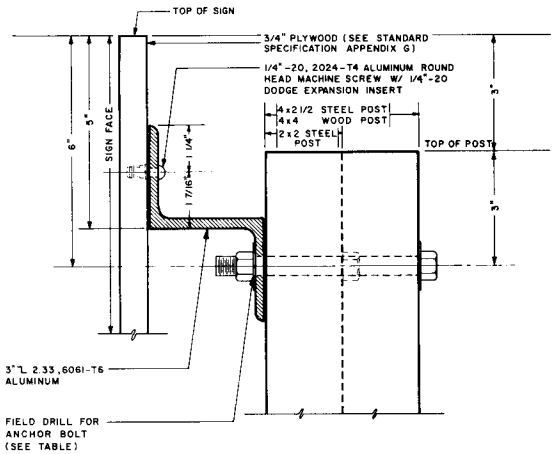
6-82 MATERIALS

6-82.10 BACKING STIFFENERS. Backing stiffeners, when specified, shall be 3'' 6061-T6 aluminum zees, 2.33 lbs/ft. (Fentron Highway Products, Seattle, Washington) or CO-approved equivalent. Unless otherwise specified, stiffeners will be provided on signs sized at 32'' high and 48'' wide or larger. Stiffeners shall be installed as shown.



PLYWOOD SIGN PANEL

STEEL POST	WOOD POST	2024-T4 ALUMINUM SIZES ARE MINIMUM		
		BOLT SIZE	NUT SIZE	WASHER SIZE
2"x 2"		3/8"x 3 1/2"	3/8"	1" O.D. 7/16" I.D.
4"x 2 1/2"	4"x 4"	3/8"x 5 1/2"	3/8"	1" O.D. 7/16" I.D.
4"x 6"	4"x 6"	3/8"x 7"	3/8"	1" O.D. 7/16" I.D.
	6"x 6"	3/8"x 7"	3/8"	1" O.D. 7/16" I.D.



ALUMINUM BACKING ZEE DETAIL

NOTE:
ALUMINUM BACKING ZEES ARE TO BE INSTALLED ON PLYWOOD SIGNS HAVING A MINIMUM SIZE OF 42" WIDE 38" HIGH.

ALL PLYWOOD SIGN REQUIRING VERTICAL SPLICES SHALL HAVE A MINIMUM OF TWO ALUMINUM BACKING ZEES.

ALUMINUM BACKING ZEES AND SIGN BACKS SHALL BE PAINTED BEFORE ATTACHING BACKING ZEES.

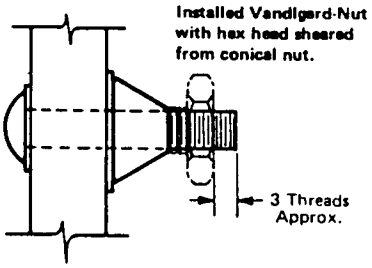
6-82.20 SIGN MOUNTING HARDWARE. Vandal-resistant hardware shall be used where possible. This hardware shall be as manufactured by THE TUFNUT WORKS, 236 Montezuma Street, Santa Fe, New Mexico 87501, (505) 983-2522, or CO-approved equivalent.

6-82.30 METAL TUBING (WEATHERING STEEL). Hot rolled, flashing, welded mechanical steel tubing ASTMA 500.

EXAMPLE

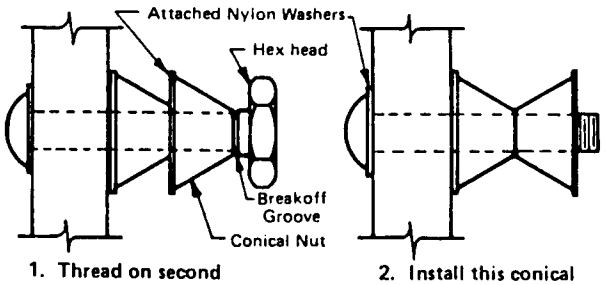
VANDLGARD-NUT—INSTALLATION AND REMOVAL

INSTALLATION



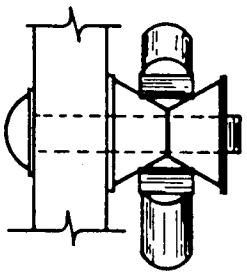
1. Install Vandlgard nut by tightening hex until it shears.
2. Use nylon washers.

REMOVAL

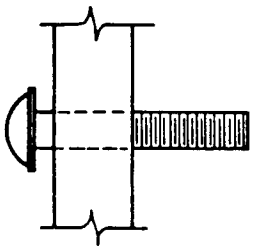


1. Thread on second Vandlgard and twist off hex. Remove the remaining conical nut.

2. Install this conical nut in the inverted position.



3. Squeeze both nuts firmly with vise-grips and remove both nuts together.



4. Original bolt is undamaged and ready for reuse.

Available from:

Federal Prison Industries

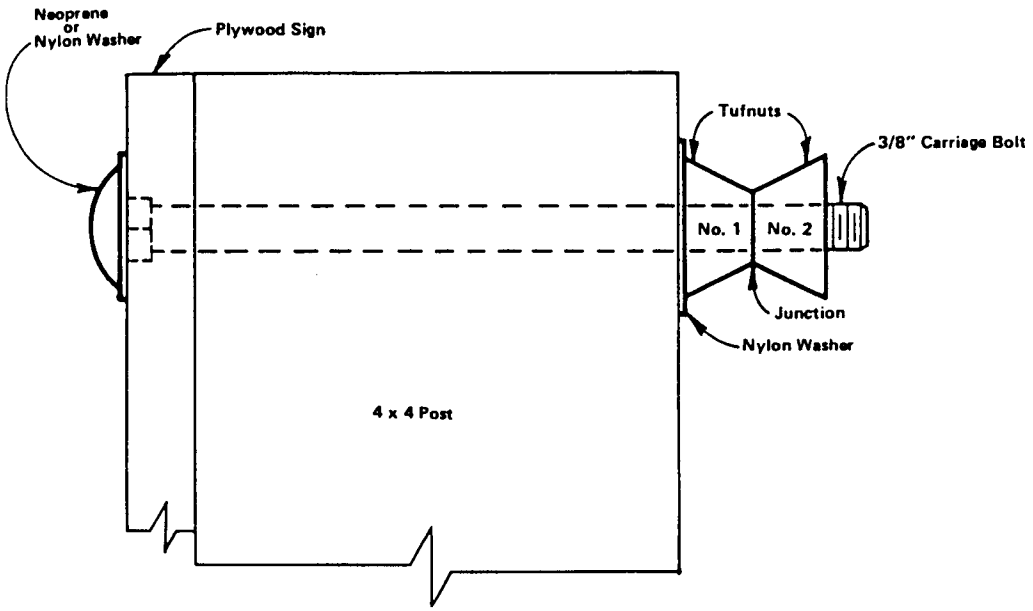
Vol-Shan, P.O. Box 512
Culver City, Calif. 90230

Ojo Caliente Craftsmen Inc.
Ojo Caliente, N. Mex. 87549

ASSEMBLY COMPONENTS	DESCRIPTION	MATERIAL	FINISH & COLOR
VCB 144	Bolt—5/16-18 x 6" Round head	C1018 Steel or equiv.	Cadmium plate per QQ-P-416 Type II Cl. 2 or zinc plate per QQ-Z-325 Type II Cl. 1 — Olive drab Dichromate
VCN 145-5	Nut—5/16-18 Vandlgard	Aluminum alloy QQ-A-430	Anodize per MIL-A-8625 Color. Green
VCW 146	Washer—5/16 I.D. x 7/8 O.D. x 1/16" thick	6/6 Nylon	Brown
VC 147	Complete Hardware Assembly		

EXAMPLE

Sign Installation Hardware
"Tufnut" (Pyramidal nuts)
Anti-theft, Anti-vandal Fasteners



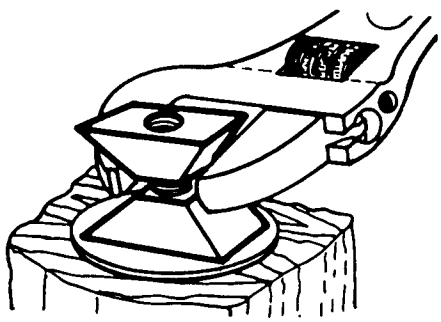
Typical Installation Procedure

Step 1: Install first Tufnut (No. 1) finger tight as shown.

Step 2: Install second Tufnut (No. 2) finger tight as shown.

Step 3: Insert wrench at junction to tighten (or loosen) as necessary.

Step 4: Remove Tufnut No. 2, then installation is complete.



Typical Tufnut
(for 3/8" Carriage Bolt)

(Not to Scale)

Minimum Order—100

Single Tufnut is difficult to remove because of its shape. Always use (4) Tufnuts for two-post sign installation.

Available from:

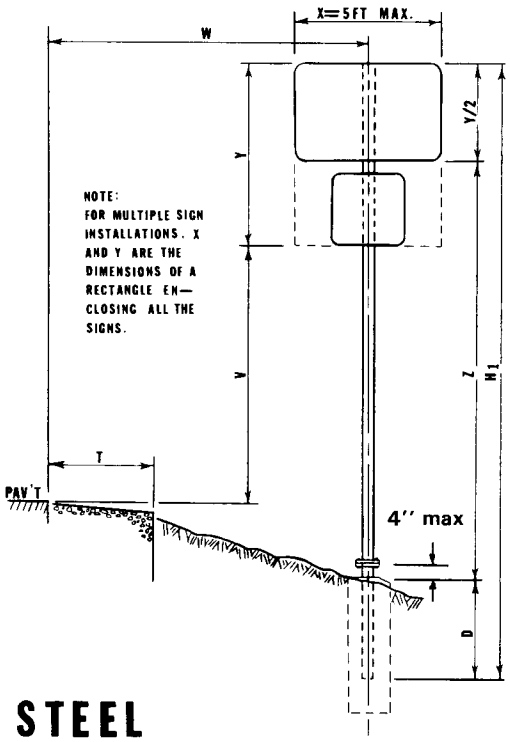
Ojo Caliente Craftsmen Inc.
Ojo Caliente, N. Mex. 87549

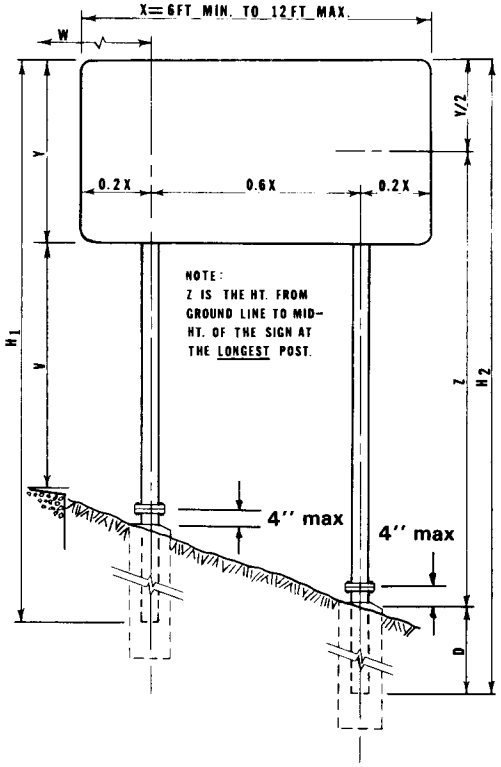
Tufnut Works
236 Montezuma St.
Santa Fe, N. Mex. 87501

Federal Prison Industries

6-83 SIGN SUPPORTS

6-83.10 STEEL POST SELECTION





STEEL POST SELECTION

NOTE:
TABLE VALUES SHOWN ARE THE MAX. PERMITTED. EXCEPT FOR D.

CATEGORY 1, 1A, 2, 3.

NO. OF POSTS		1	2	3	D
POST SIZE	2"x 2"x.095"	69	139	208	3'
	4"x 2.5"x.125"	262	524	786	3'
	6"x 4"x.203"	1027	2054	3081	3'
		(X)(Y)(Z) in FT^3			

DESIGN EXAMPLE

GIVEN: 15 FT WIDE, 8 FT HIGH SIGN; X=15', Y=8'.
3FT WIDE SHOULDER, WITH .05'/FT SLOPE; T=3'.
FROM EDGE OF PAVEMENT TO ℄ OF NEAREST POST IS 12 FT; W=12'.
STD. MOUNTING HT. IN THIS CASE IS 5 FT; V=5'.
EMBANKMENT SLOPE IS 6:1 (1'VERT. DROP FOR EVERY 6' HORIZ.)

SOLUTION: Z=1/2 HT. OF SIGN(Y) + MOUNTING HT. (V) + SHOULDER WIDTH (T) x SHOULDER SLOPE + DIST. FROM EDGE OF SHOULDER TO ℄ OF LONGEST POST (W−T+.6X) x EMBANKMENT SLOPE.

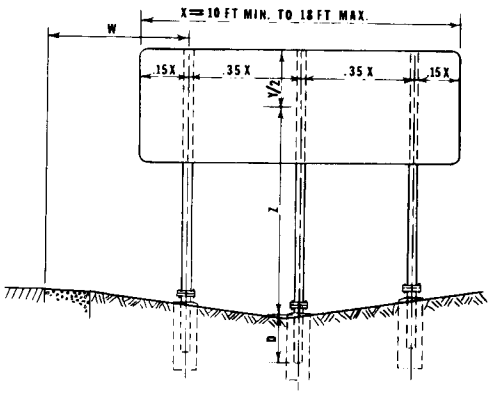
Z=Y/2 + V + T(SHOULDER SLOPE) + (W−T+.6X)(EMBANKMENT SLOPE)

Z= 8/2 + 5 + (3 x .05'/FT) + (12−3 + .6(15)) at 6:1

Z= 4 + 5 + .15 + 18 at 6:1 = 9.15 + 3 = 12.15

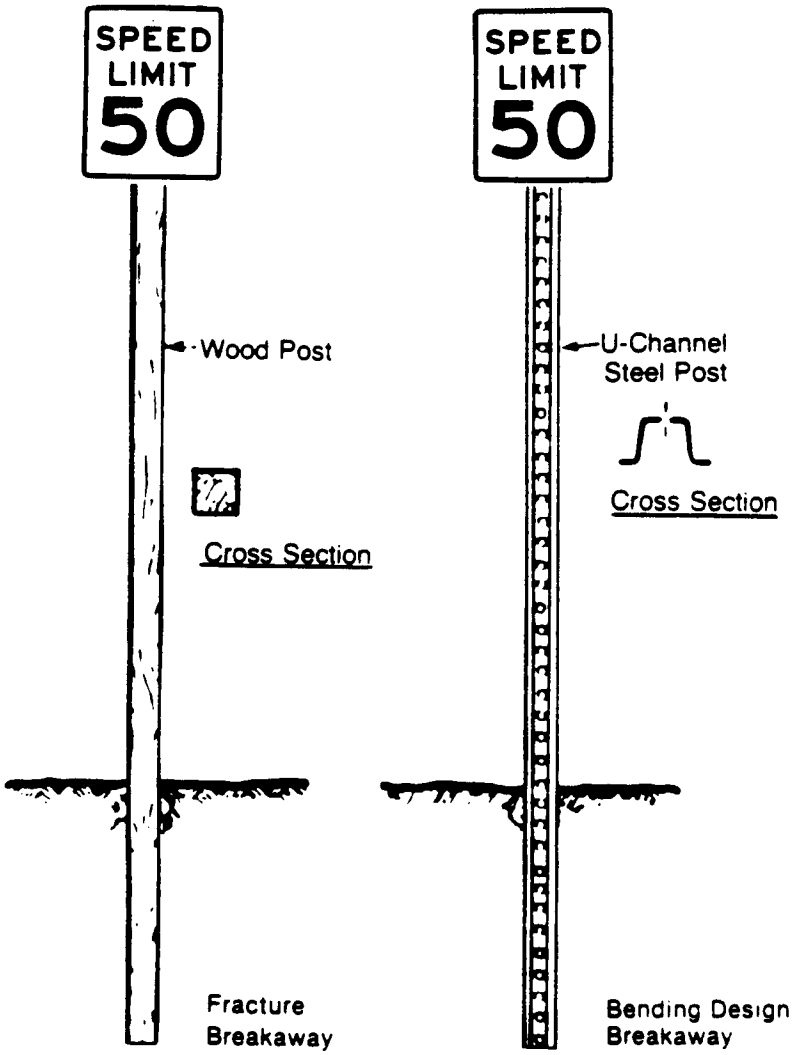
(X)(Y)(Z) = (15)(8)(12.15) = 1458

ANSWER: FROM TABLE SELECT POST(S) HAVING (X)(Y)(Z) OF 1458 OR MORE; USE TWO 6"x 4" POSTS.

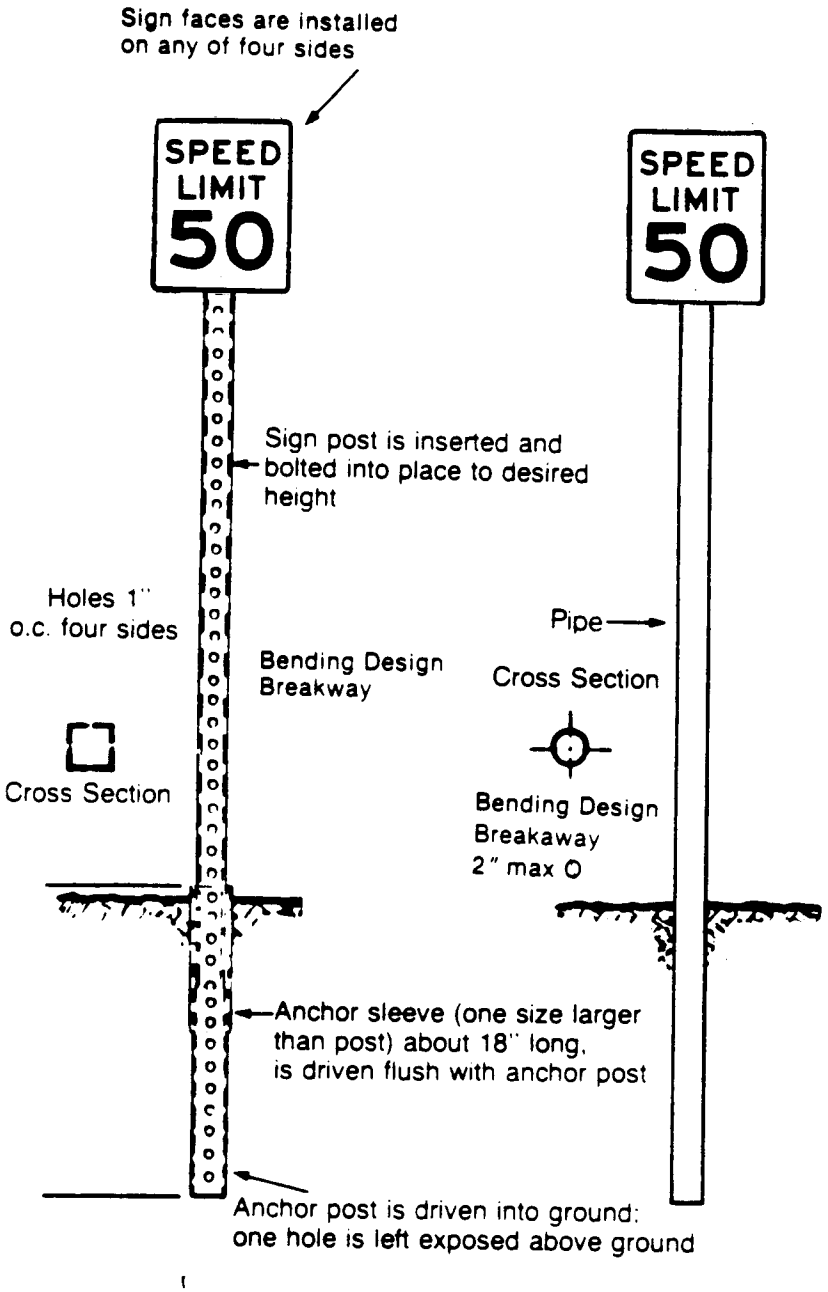


EXAMPLE

Sign faces are installed
on any of four sides

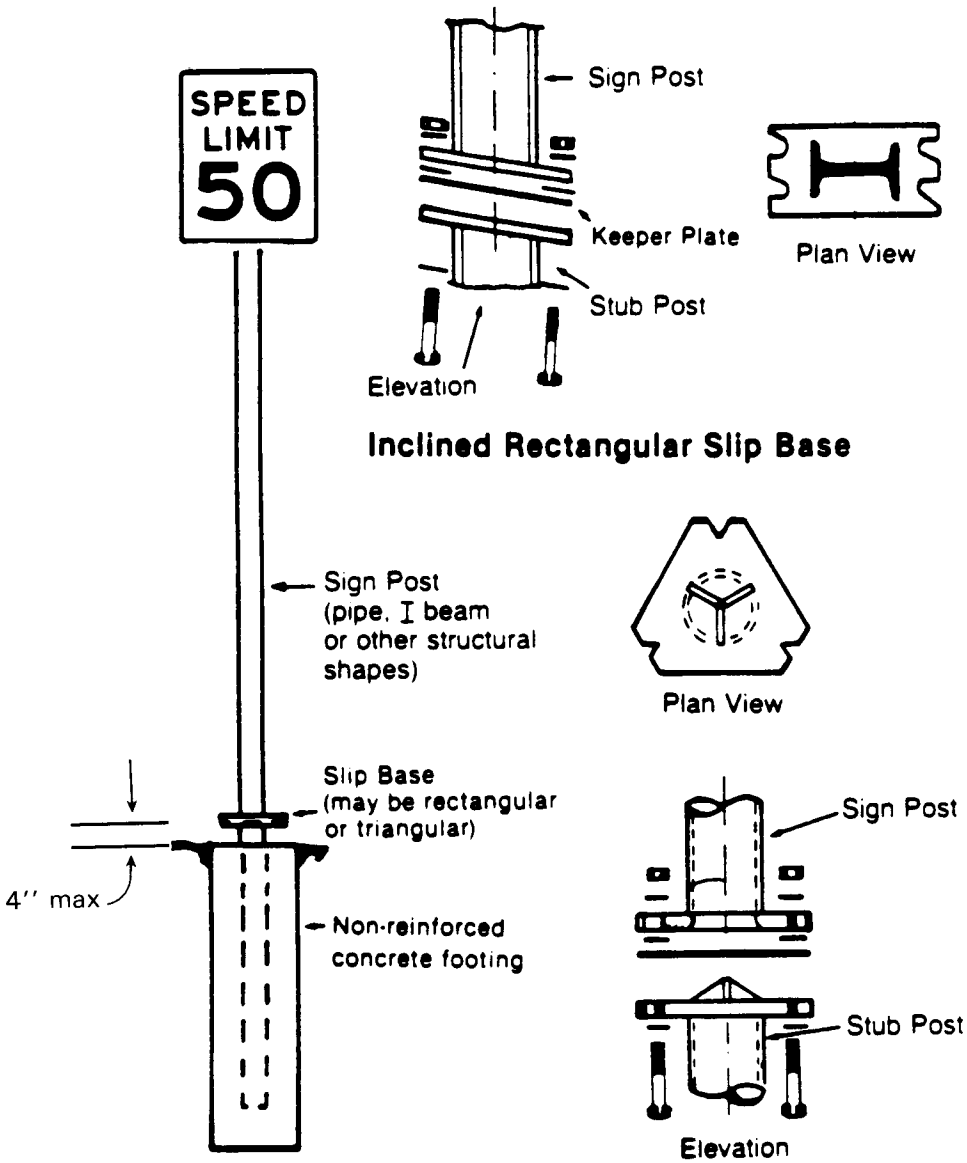


EXAMPLE



Sign Support Systems

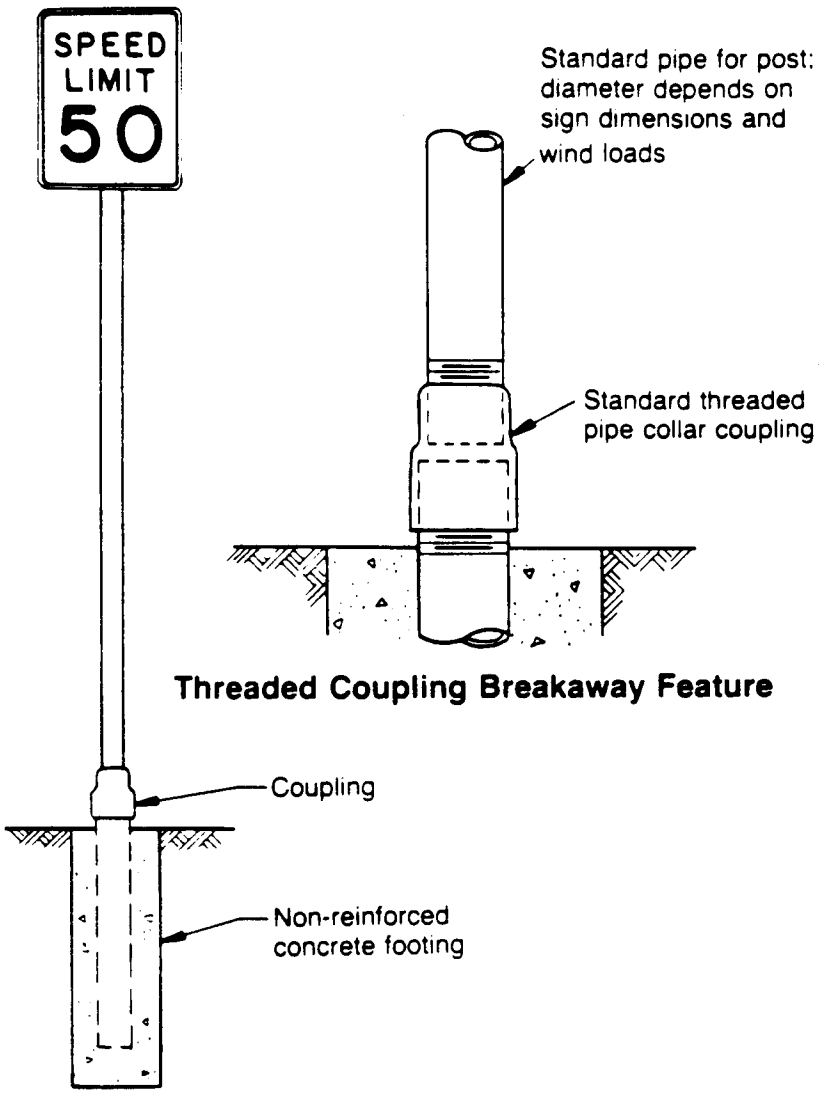
EXAMPLE



Inclined Rectangular Slip Base

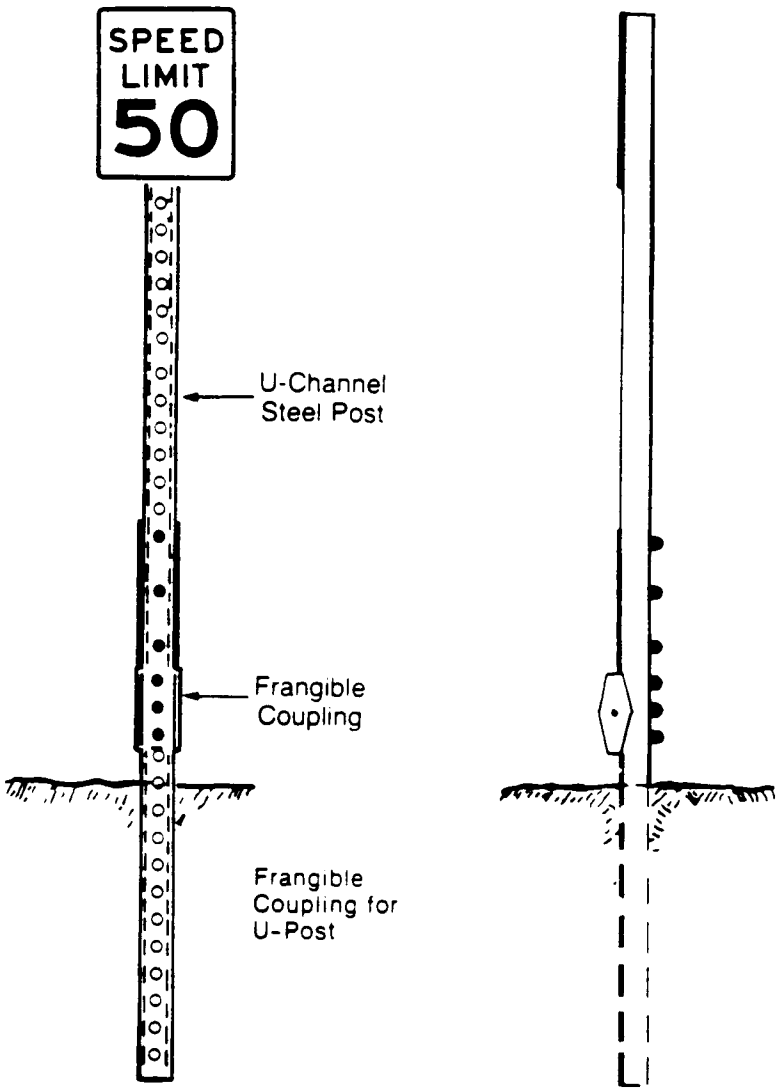
Triangular Slip Base

EXAMPLE



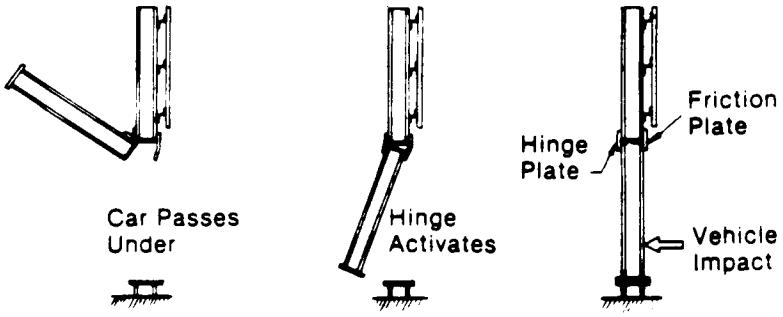
Threaded Coupling Breakaway Feature

EXAMPLE


SPEED
LIMIT
50
U-Channel
Steel Post
Frangible
Coupling
Frangible
Coupling for
U-Post

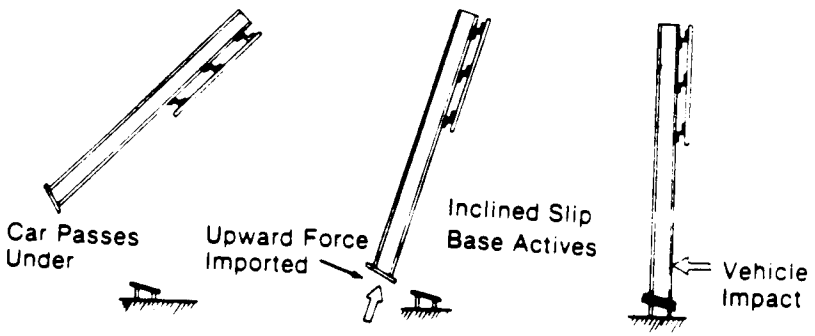
EXAMPLES

Note: This device is used for signs with two or more posts.



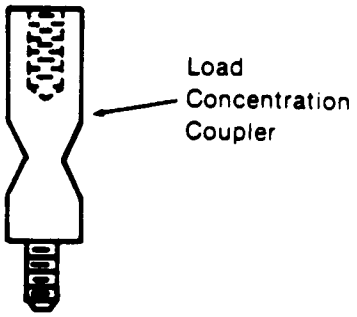
Breakaway Action—Horizontal Slip Base

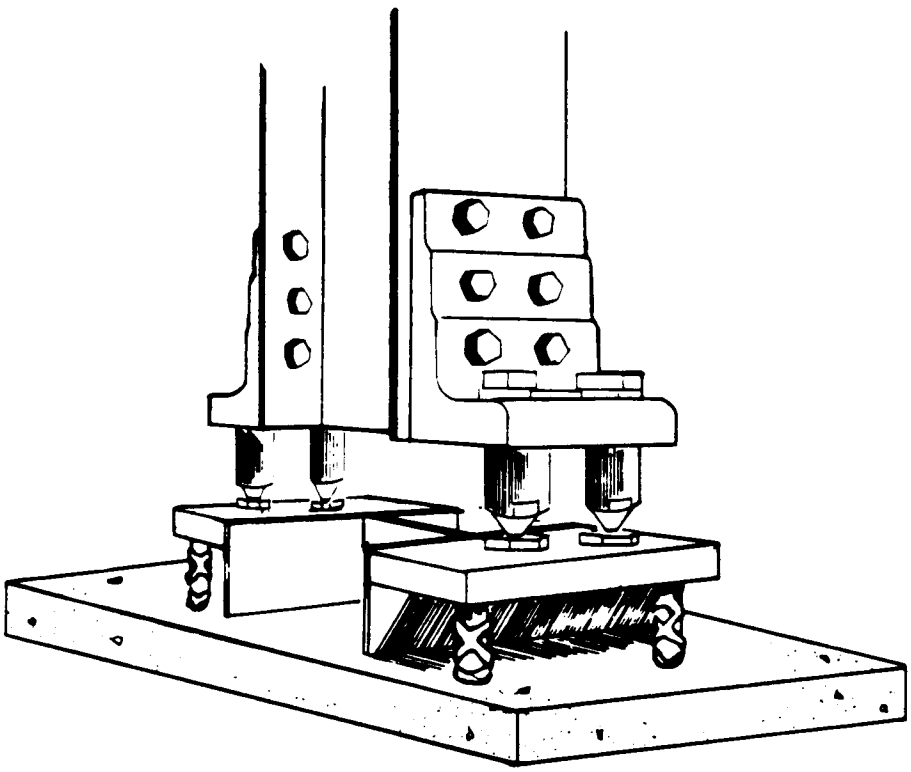
Note: For use with Single Post Sign Systems



Breakaway Action—Inclined Slip Base

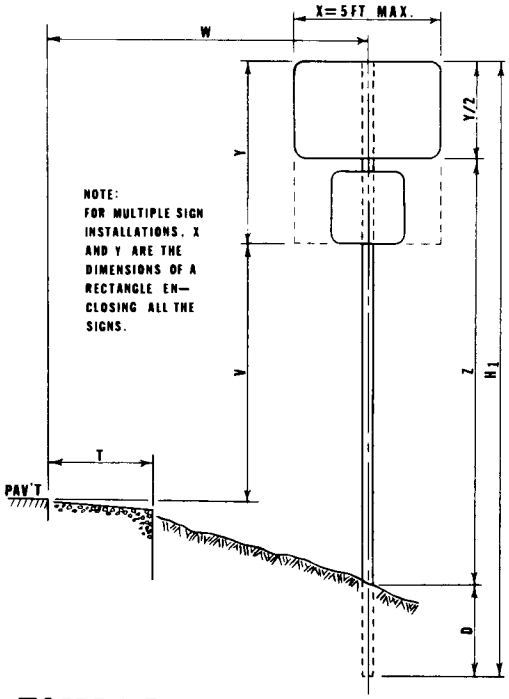
EXAMPLE

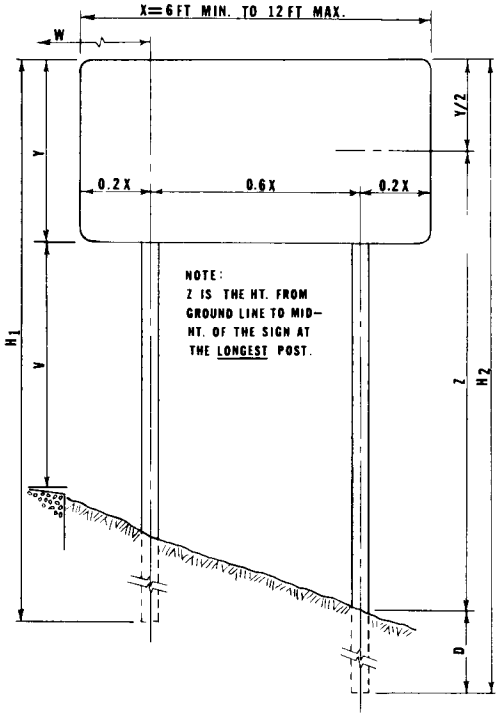




Load Concentration Coupler

6-83.20 TIMBER POST SELECTION





TIMBER POST SELECTION

NOTE:
VALUES SHOWN ARE THE MAX. PERMITTED. IF THE QUANTITY (X)(Y)(Z) EXCEEDS THE TABLE LIMITS FOR 6"x6" POST, USE STEEL POST INSTALLATION.

CATEGORY 1, 1A, 2, 3.

NO. OF POSTS		1	2	3	D
POST SIZE	4 x 4	80	155	235	3′
	4 x 6	180	365	545	4′
	6 x 6	235	475	710	4′
		( )(′)( ) in FT³			

DESIGN EXAMPLE

GIVEN: 2 SIGNS—ONE 3FT WIDE, 4FT HIGH; THE OTHER 18 INCHES WIDE, 2FT HIGH AND MOUNTED 3 INCHES BELOW THE FIRST SIGN. X=3′ Y=4′ + 0′-3″ + 2′= 6′-3″ or 6.25′. STD. MOUNTING HT. IN THIS CASE IS 5FT; V=5′. 3FT WIDE SHOULDER, WITH .05′/FT SLOPE; T=3′. FROM EDGE OF PAVEMENT TO ℄ OF NEAREST POST IS 12 FT. W=12′; EMBANKMENT SLOPE IS 6:1.

SOLUTION: Z=1/2 HT. OF SIGN (Y) + MOUNTING HT. (V) + SHOULDER WIDTH (T) x SHOULDER SLOPE + DIST. FROM EDGE OF SHOULDER TO ℄ OF POST (W−T) x EMBANKMENT SLOPE.

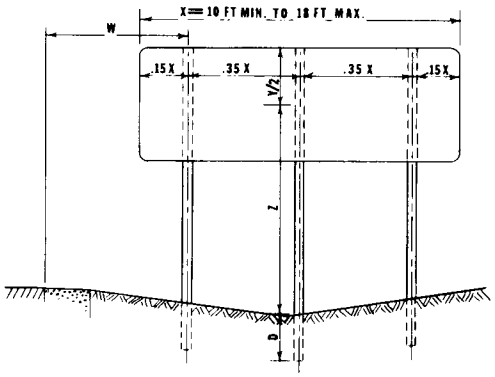
$Z = Y/2 + V + T(\text{SHOULDER SLOPE}) + (W-T)(\text{EMBANKMENT SLOPE})$

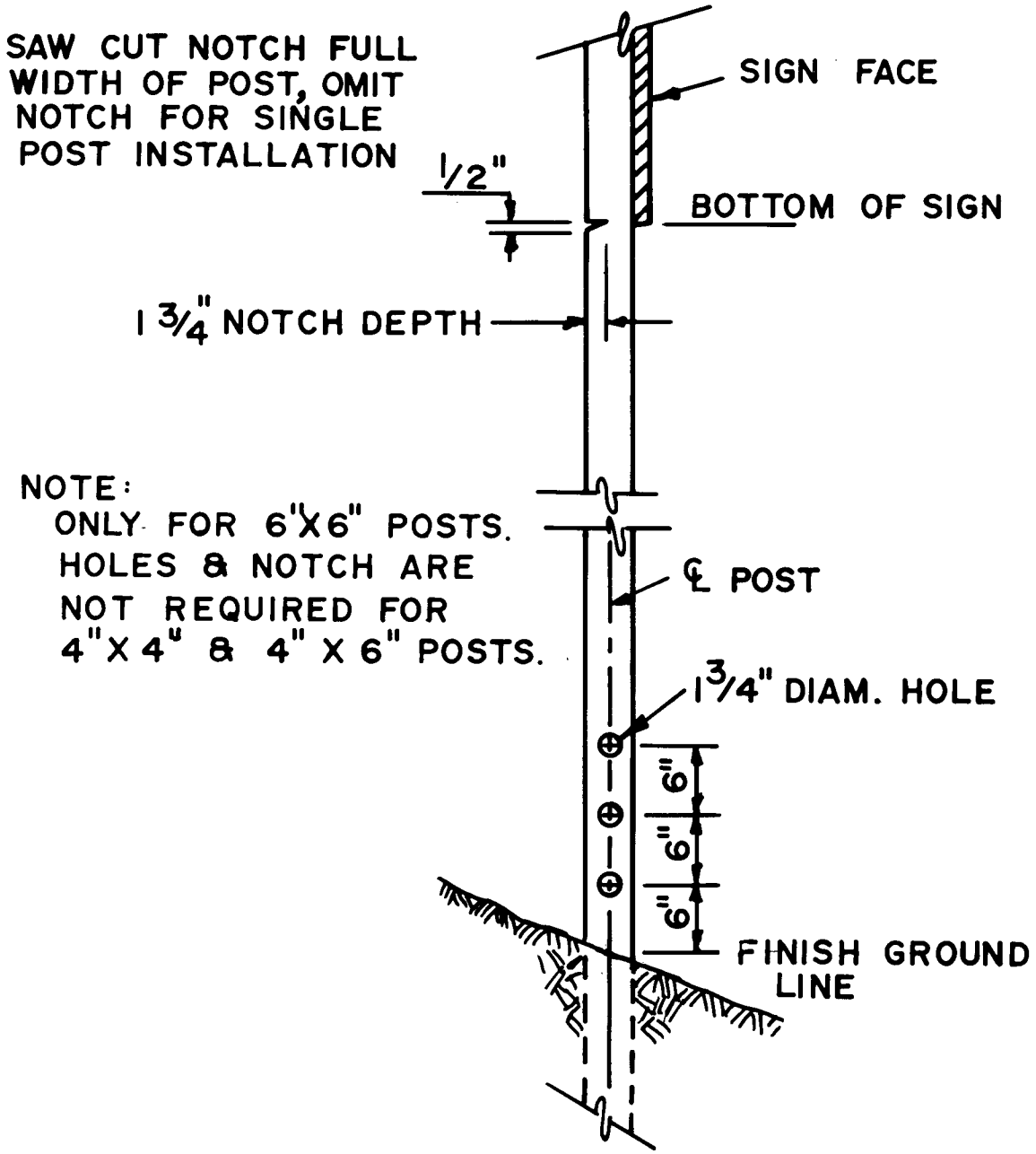
$Z = 6.25/2 + 5 + (3 \times .05'/FT) + (12-3)$ at 6:1

$Z = 8.1 + .15 + 1.5 = 9.75$

$(X)(Y)(Z) = (3)(6.2)(9.75) = 181.4$

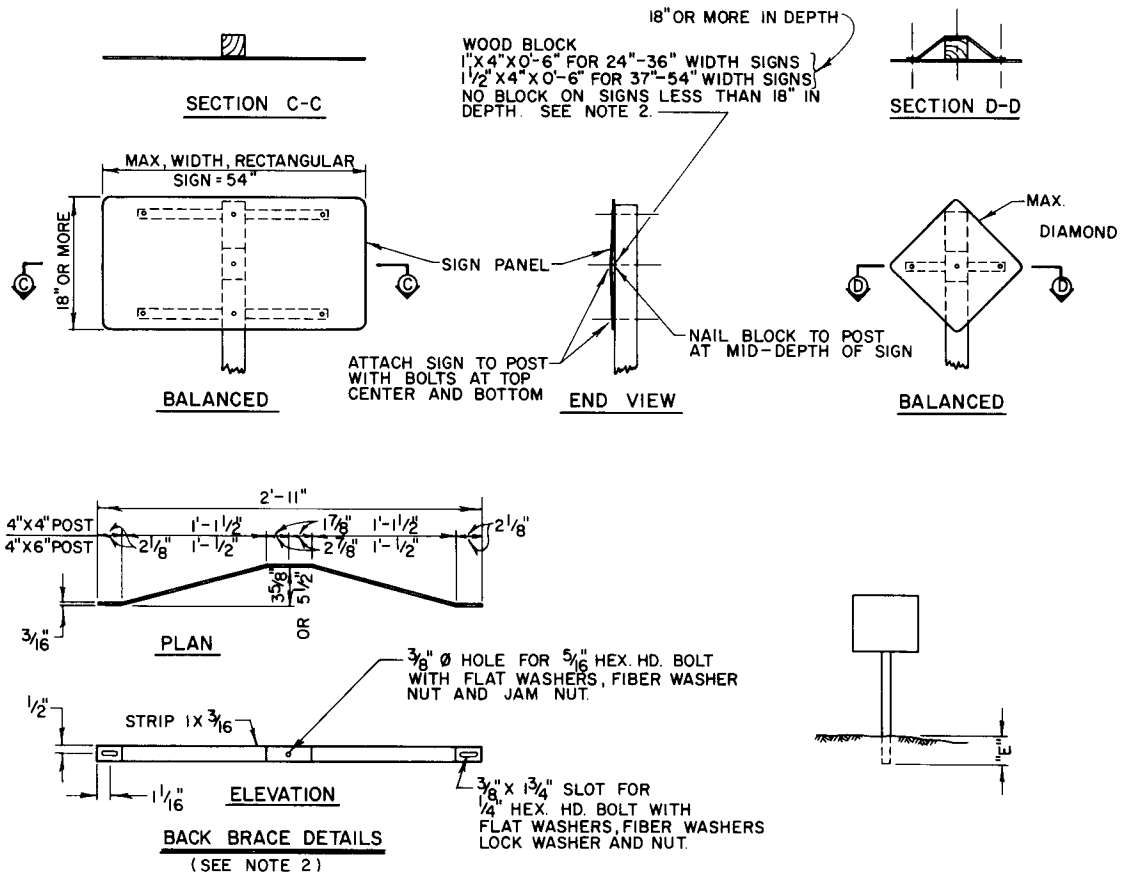
ANSWER: FROM TABLE SELECT POST HAVING (X)(Y)(Z) OF 181.4 OR MORE, USE ONE 6″x6″ POST.





TIMBER POST DETAIL WITH BREAKAWAY

6-83.40 SIGN BRACING



NOTES:

1. PLACE LONG DIMENSION OF POST CROSS SECTION NORMAL TO SIGN AXIS.
2. BALANCED SINGLE POST INSTALLATIONS OF UNFRAMED SINGLE SHEET ALUMINUM PANEL SIGNS SHALL HAVE BLOCKS IF 18" OR MORE IN DEPTH AND A COMBINATION OF BLOCKS AND BACK BRACES IF 18" OR MORE IN DEPTH AND 34" OR MORE IN WIDTH. SIGNS PANELS LESS THAN 18" IN DEPTH AND 34" OR MORE IN WIDTH SHALL HAVE BACK BRACES ONLY.
3. BALANCED SINGLE POST INSTALLATIONS OF LAMINATED PANEL AND FRAMED SINGLE SHEET PANEL SIGNS REQUIRE BACK BRACES WHEN 34" OR MORE IN WIDTH.

USE OF WOOD BLOCK AND BACK BRACES FOR ADDED STIFFNESS ON METAL OR WOODEN BACKED SIGNS